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Michigan's Predicted Timber Yields 1981-2010

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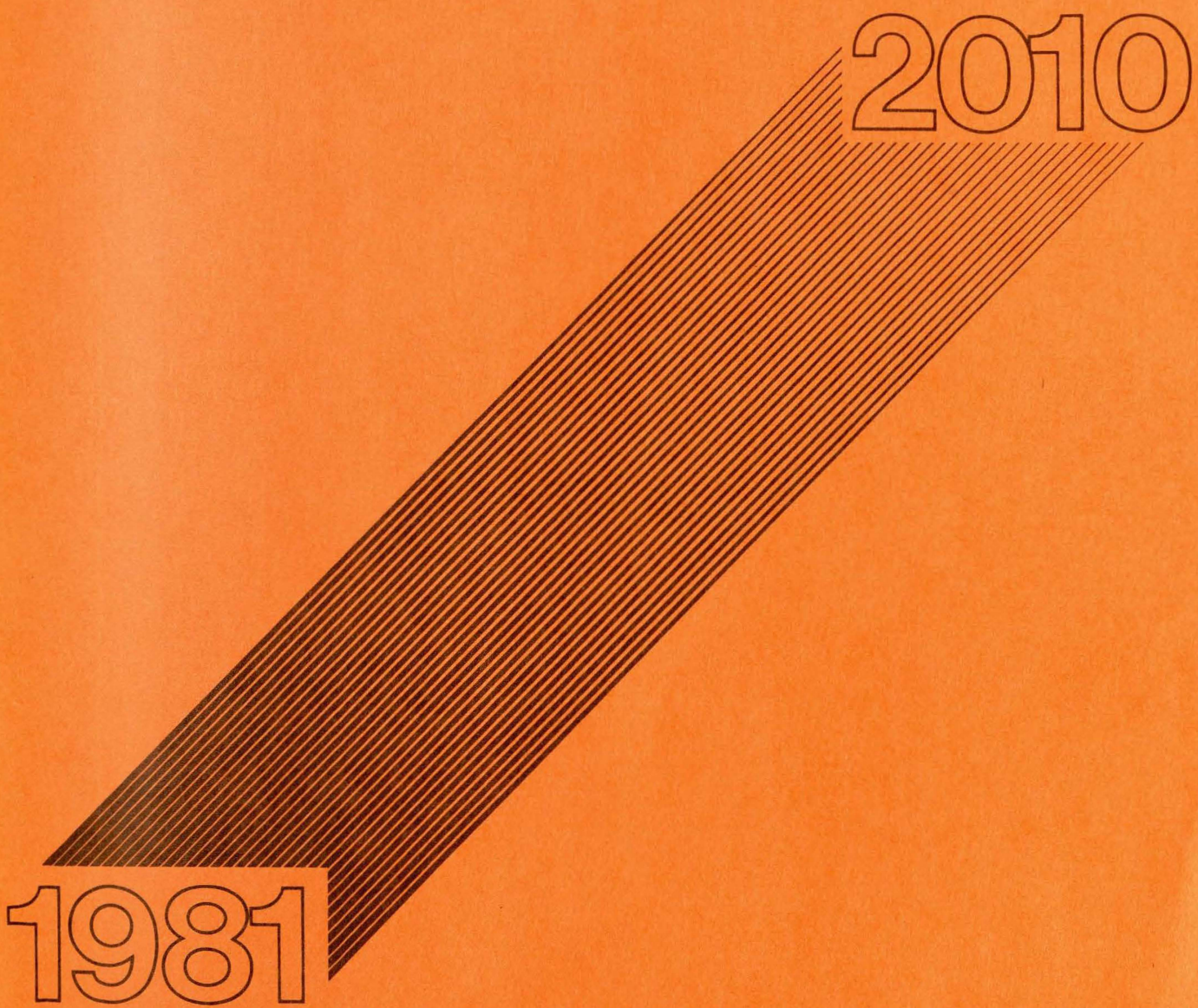

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FOREWORD

Forest Inventory Analysis (FIA) is a continuing effort mandated by the Forest and Rangeland Renewable Resources Planning Act of 1974 (P.L. 93-378). One objective of the Act is the evaluation of timber management opportunities. In partial fulfillment of this objective, treatment opportunities were analyzed for Michigan forest conditions projected for the period 1981-2010.

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MICHIGAN'S PREDICTED TIMBER YIELDS 1981-2010

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Efficient management of Michigan's timber resource today depends, in part, on the knowledge of what is likely to happen in the future—can supplies of timber continue to increase, will demand for forest resources increase? In an effort to answer questions concerning potential timber supply, we projected Michigan's forest resources 30 years into the future. We identified forest stands qualifying for harvest, thinning, or timber stand improvement (t.s.i.) during the projection period constrained by area control, and then we predicted timber yields from these activities.

We refer to these predicted yields from all management activities as our estimate of long-term timber supply. Long-term timber supply was calculated by using only medium- to well-stocked timber stands—poorly stocked stands were removed from the projection data base and placed in the treatment category identified as stand conversion or restocking. After presenting projection values, we compare our estimate of long-term timber supply to an estimate of long-term timber demand. We also compare 1979 average annual growing-stock removals and average annual growing-stock removals for the decade 1981-1990. We provide examples of how forest managers and planners can gear the study findings to a particular user or region. Finally, we estimate Michigan's sustained yield, including yields from tops and limbs of cut trees.

There is no one correct estimate of timber supply—forest acreage treated or volumes removed during management activities—instead, acreages and volumes vary, according to the treatment criteria specified. This paper presents an area control alternative, which is just one of many possible management scenarios for Michigan's forests.

Michigan's timber resources have played a vital role in the settlement and development of the State. Today, many forest users vie for economic and natural resources.

Michigan's lumber and wood products industries continue to provide jobs and revenue for the State, particularly in areas where alternative employment and investment options may be limited. In 1980 an estimated 60,000 employees were working in Michigan's primary and secondary wood processing industries.[1]

To ensure that Michigan's lumber and wood products industries continue to play a vital role in the State's economy, timber resources must be managed and used efficiently.

ASSUMPTIONS

Two assumptions are essential to this study: (1) all commercial forest land is available for treatment and (2) markets exist for all species and products. The analysis does not consider possible economic, social, or political constraints on timber removals. Nor does it address increased utilization through improved technology, intensified management, or genetically improved stock. Harvest treatment opportunities and predicted yields are based on an area control model—assuming that it is desirable to have an even distribution of acreage by age class within each forest type by the end of one rotation.

METHODS

The process of determining silvicultural treatment opportunities for Michigan involved four steps: (1) modify an existing computerized tree growth model to handle the Michigan inventory data and special output requirements; (2) select treatment options and define treatment criteria; (3) project commercial forest area for the next 30 years; and (4) project the current inventory, assess treatment options, and produce summary tables. Each step of the process is described in detail below.

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[1]*Michigan Department of Natural Resources.*

Modify STEMS

The Stand and Tree Evaluation and Modeling System (STEMS) is a set of computer programs for projecting the growth of forest stands in the Lake States (later versions will include other geographic regions) for any combination of tree species and sizes. Three modifications were made in STEMS for the Michigan 30-year projection.

First, the STEMS growth functions for each species were fine-tuned to reflect local conditions. Calibration data were obtained from plots established in 1966 and remeasured during the 1980 Michigan forest inventory. Calibration data were validated by using an independent data set.

Second, the computerized Lake States management algorithm in STEMS was replaced by an algorithm developed specifically for Michigan. This algorithm was developed by using management criteria discussed in detail below—only in the case of t.s.i. were the STEMS management guides left intact. Processing within the management algorithm was also modified to handle harvest projections under an area control model with a changing commercial forest land base.

Finally, an output algorithm was developed that would produce the desired tables. Tables produced for each Survey Unit and each decade of the projection period summarize information on the areas qualifying for harvest, thinning, and t.s.i. as well as information on the volumes that would be removed during treatment operations.

Define Management Criteria

Treatment options and criteria were determined during discussions with representatives of the Michigan Department of Natural Resources (MDNR). Four treatments were considered for the Michigan projection: (1) harvest, (2) thinning, (3) t.s.i., and (4) stand conversion or restocking. Definitions of each treatment and descriptions of treatment criteria follow.

Harvest

Harvest is the final cut in a forest stand. To facilitate the use of the area control method, the final cut in all forest types was a clearcut. Because we assumed that all harvests are followed by natural or artificial regeneration, harvest acreage does not reappear in the stand conversion or restocking treatment category.

The harvest area for any forest type is set by an area control algorithm. The area control algorithm sets the harvest acreage for each decade and for each forest type so that the type area will be evenly distributed among age classes by the end of one rotation.

The annual area control harvest acreage is determined for each forest type by dividing the number of acres in a forest type by the type's rotation age. Harvest acreage for the decade is 10 times the annual area control harvest acreage. The rotation age for each forest type was set by the MDNR (table 1). Rotation ages used in this analysis are from a harvest schedule that State officials feel best represents current or desired management practices.

Thinning

In this report, thinning is a partial cut of commercial material before the final harvest cut. Criteria for scheduling thinning include stand age and basal area. For the red pine and white pine forest types, the MDNR assigned pre-thinning and post-thinning basal areas (table 1). For the balsam fir, white spruce, oak-hickory, and maple-birch forest types, STEMS thinning criteria were used (Brand 1981). Thinning is not considered a viable treatment option in the jack pine, black spruce, northern white-cedar, tamarack, or exotic forest types.

Stands within 10 years of rotation age were not considered for thinning because we assumed that it would not be feasible to thin a stand and then return in less than 10 years for final harvest.

Timber Stand Improvement

The t.s.i. treatment category is made up of management operations that have traditionally been thought of as noncommercial or precommercial—such as the weeding, cleaning, or releasing of a timber stand. Today, it may be feasible to recover some of the material from t.s.i. for fuelwood or other products. Timber stand improvement treatment criteria built into STEMS were used for assigning t.s.i. in Michigan (table 1). STEMS uses site index, stand age, and basal area to assign t.s.i.

Stand Conversion or Restocking

Stands qualifying for stand conversion or restocking present opportunities for increasing utilization of commercial forest land. Only poorly stocked commercial forest plots were assigned to the stand conversion or restocking treatment category. Poorly stocked plots include nonstocked areas where stock-

ing of growing-stock trees is less than 16.7 percent and areas where stand basal area is less than or equal to 19 + 0.38 (stand age). This general equation, developed by Forest Service researchers, identifies non-seedling stands in which stocking, in relation to age, is so low that the stands are not expected to reach a level of stocking adequate for commercial timber production by rotation age.

STEMS was used to project stand and tree characteristics for stocked commercial forest plots only. For each decade, poorly stocked areas were withdrawn from the data base used in STEMS and placed in a separate file. Poorly stocked stands were not included in the data base because it is difficult to assign a meaningful forest type to these stands, and thus is difficult to trace these stands through the projection process. We assumed that these stands are poorly stocked because (1) adverse site conditions dictate extraordinary regeneration efforts or (2) management objectives that preclude timber management are already in place. Because stand and tree characteristics of poorly stocked stands were not projected, volume information for stand conversion or restocking areas is available for 1980 only.

Forecast Changes in Commercial Forest Area

Because harvest treatment areas are selected by an area control algorithm, it is important to have realistic estimates of commercial forest area throughout the projection period. For each Unit we analyzed historical trends in commercial forest area by forest type and projected forest type areas based on these trends. Representatives from the MDNR reviewed the area projections. Their predictions were used when different from those indicated by trend analysis (table 2).

In 1977, commercial forest area was projected for each State through the year 2030 in accordance with R.P.A. requirements (Wall 1981). Forest and Rangeland Renewable Resources Planning Act (R.P.A.) estimates for Michigan were based on the 1966 forest inventory. These area projections underestimated the decline in commercial forest area between 1966 and 1980. R.P.A. estimates place the decline in commercial forest area between 1966 and 1980 at approximately 230,000 acres, but the new inventory shows a 1.4 million-acre decline. By 2010 our estimates of commercial forest area are 2 percent less than the R.P.A. estimates. Because our numbers are based on the most recent forest inventory, we feel they are the most realistic.

Data from 1980 indicate that approximately 6 percent of the commercial forest land in the State is poorly stocked. We assumed that the proportion of poorly stocked commercial forest land to the total commercial forest area would remain constant, at 1980 levels, throughout the projection period. There will always be some poorly stocked areas because of failures in regeneration efforts, weather damage, or other causes of mortality such as insects, fire, and disease. Also, some areas will be poorly stocked because they are being managed as wildlife openings.

Assessing Treatment Options

The logic used to assign treatments to each commercial forest plot is diagrammed in figure 1. Data processing involves four steps. (1) The poorly stocked commercial forest plots are removed from the data base and placed in the stand conversion or restocking treatment class. (2) Inventory tree lists from the remaining stocked commercial forest plots are fed into STEMS. At the beginning of each decade, the area control algorithm assigns the number of acres that must be cut in each forest type during the decade to achieve area control. Plots are arranged in order of stand age. Beginning with overmature stands, STEMS "cuts" plots until the area selected for harvest within each type equals the area control harvest acreage. (3) STEMS then scans the age of all plots remaining after harvest. If the stand is within 10 years of harvest, it is placed in the no treatment category. If the stand age is more than 10 years from harvest, plot characteristics are compared to thinning and t.s.i. criteria to select plots for both treatments. (4) Plots not qualifying for thinning or t.s.i. are placed in the no treatment catgory.

Tables are printed that summarize data on the areas to be treated and volumes expected from those treatments. Tables highlight information that aids data users in modifying the findings to fit conditions or management practices in their areas.

RESULTS

Highlights from the identification of Michigan's projected treatment opportunities, 1981-2010, are presented below by decade and treatment class.

Detailed information is not available by decade for areas receiving no treatment or qualifying for stand conversion or restocking. We can glean some information on the stand conversion/restocking areas from data collected during the fourth Michigan For-

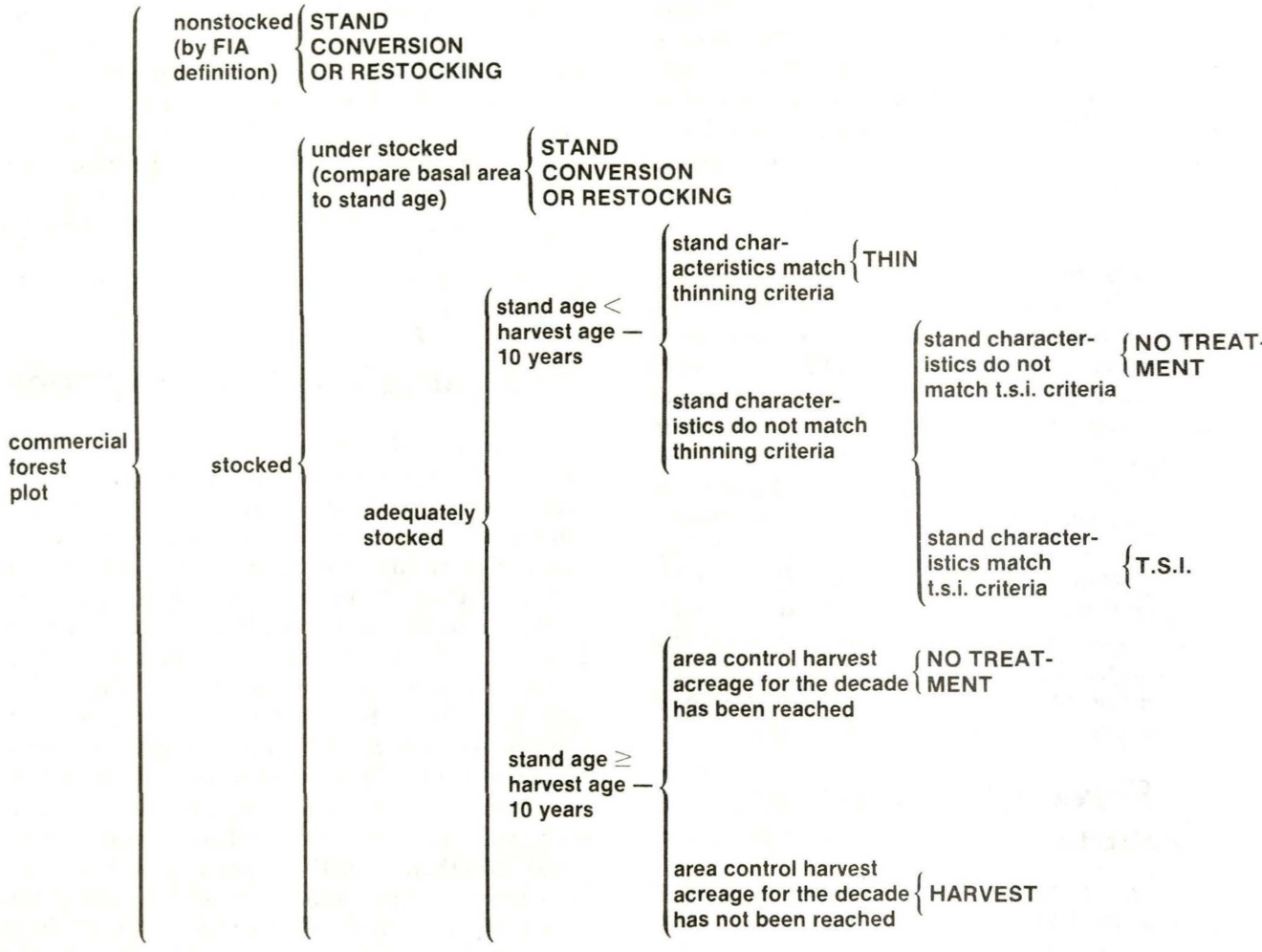
commercial forest plot
nonstocked (by FIA definition)
STAND CONVERSION OR RESTOCKING
stocked
under stocked (compare basal area to stand age)
STAND CONVERSION OR RESTOCKING
adequately stocked
stand age < harvest age — 10 years
stand characteristics match thinning criteria
THIN
stand characteristics do not match thinning criteria
stand characteristics do not match t.s.i. criteria
NO TREATMENT
stand characteristics match t.s.i. criteria
T.S.I.
stand age ≥ harvest age — 10 years
area control harvest acreage for the decade has been reached
NO TREATMENT
area control harvest acreage for the decade has not been reached
HARVEST

Figure 1.—*Logic used in assigning forest inventory plots to treatment categories, Michigan, 1981-2010. The oldest stands in each forest type-site index range are processed first.*

est Inventory. In 1980, there were 947,400 acres of commercial forest land qualifying for stand conversion or restocking (table 3). Most of these areas were nonstocked (172,200 acres), or were aspen (169,400 acres), maple-birch (161,300 acres), or elm-ash-maple (112,700 acres) stands with very low basal areas per acre. Growing-stock volume on these areas averaged 248 cubic feet per acre (table 4). Most of this volume was in sawtimber-size trees. There was an additional 34 cubic feet per acre of cull material, primarily rough and rotten trees. This general information on volume per acre and distribution of area by forest type in 1980 can be applied to the stand conversion/restocking areas throughout the projection.

Decade I (1981-1990)

Treatments are identified for the first decade of the projection by using a commercial forest land base of 17.4 million acres. This area is 109,400 acres less than that reported in 1980 during Michigan's fourth Statewide forest inventory. During Decade I, no significant treatment is prescribed for 61 percent of the commercial forest land (table 5). Of the 6.8 million acres targeted for treatment, 38 percent is harvested, 34 percent is thinned, 14 percent receives t.s.i., and 14 percent undergoes stand conversion or restocking.

Harvest

- More than 2.5 million acres is targeted for harvest, 41 percent of which is found in the Northern Lower Peninsula.

- Harvest area is concentrated in the aspen (779,500 acres) and maple-birch (663,600 acres) forest types (table 6).
- The average age of a harvested stand is 98 years. Nearly 90 percent of the harvest area comes from overmature stands (stands more than 10 years past rotation age).
- Harvests for Decade I total 4.4 billion cubic feet of growing-stock and 23.4 million cubic feet of cull material (table 7).[2]
- In all Units, hardwoods account for a majority of the growing-stock volume harvested.
- The average growing-stock volume removed per acre harvested is 1,712 cubic feet; the highest average yields come from the Western Upper Peninsula (1,826 cubic feet).
- Forty-three percent of the softwood removals volume comes from hardwood forest types; the percentage is even greater in the Western Upper Peninsula and the Southern Lower Peninsula Survey Units (table 8).
- More than half of the growing-stock volume harvested comes from stands more than 100 years old (table 9).

Thinning

- More than 13 percent (2.3 million acres) of the State's commercial forest land qualifies for thinning; the Western Upper Peninsula and Northern Lower Peninsula account for the bulk of the area (table 5).
- The maple-birch forest type supplies 85 percent of the area targeted for thinning—32 percent of the maple-birch forest type has been placed in this treatment category (table 10).
- In the maple-birch forest type, stands between the ages of 21 and 80 qualify for thinning; in all other forest types, stands qualifying for thinning are less than 51 years old.
- During the decade, nearly 1.3 billion cubic feet of growing stock and 81.6 million cubic feet of cull are removed during thinning operations (table 11).
- Although harvest volume is concentrated in sawtimber trees (75 percent), thinning volume is concentrated in poletimber trees (64 percent).
- On average, 548 cubic feet of growing stock are removed per acre thinned, although the average is higher in some Units and in some forest types (table 12).
- Thinning volumes are concentrated in 41-60-year-old stands (table 13).

[2]*Average annual treatment volumes from the tables have been converted to treatment volumes for the decade to facilitate analysis.*

Timber Stand Improvement

- A total of 927,100 acres are selected for t.s.i., 732,200 in the maple-birch forest type (table 14).
- The Western Upper Peninsula and the Northern Lower Peninsula each account for more than one-third of the t.s.i. area.
- Timber stand improvement occurs in stands 1-80 years of age; younger stands are concentrated in softwood forest types and older stands are concentrated in the hardwood forest types.
- Timber stand improvement yields total 56.9 million cubic feet of growing stock and 2.9 million cubic feet of cull in Decade I (table 15).
- Growing-stock volume from t.s.i. is concentrated in hardwood species and sawtimber-size trees. However, in the Northern Lower Peninsula, softwoods account for 73 percent of the total growing-stock volume from t.s.i, and poletimber-size trees account for 51 percent of the total (table 16).
- Although t.s.i. area is concentrated in the maple-birch forest type, t.s.i. growing-stock volume is concentrated in the white spruce and white pine forest types (table 17).

Decade II (1991-2000)

In Decade II, the commercial forest land base is projected to be 17.3 million acres, down 109,200 acres from Decade I. The area of all forest types is projected to decline, except for the red pine, white pine, northern white-cedar, and maple-birch types.

As in Decade I, no significant treatment was prescribed for 67 percent of the commercial forest land in the second decade (table 18). Thinning is the most common treatment, scheduled for 2.6 million acres between 1991 and 2000. The area qualifying for thinning increased 14 percent between Decades I and II.

More than 2.5 million acres of commercial forest land is targeted for harvest, down 1 percent from Decade I. The decline in harvest area reflects the decline in commercial forest area between decades. This decline is expected because the area control harvest acreage is recalculated at the beginning of each decade by using the projected commercial forest areas for that decade.

The greatest change in treatment between Decade I and II came in the t.s.i. category—448,600 acres qualify for t.s.i. in Decade II compared to 927,100 acres in Decade I.

Harvest

- Harvest area is concentrated in the Northern Lower Peninsula Unit in Decade II as it was in Decade I—more than 1.0 million acres of the 2.5 million acres targeted for harvest in the State is found in the Northern Lower Peninsula.
- The aspen (760,200 acres) and maple-birch (674,300 acres) forest types continue to account for a majority of the harvest area (table 19).
- The average age of a harvested stand is 86 years, 12 years younger than in Decade I.
- Over the decade, harvest activities yield 5.3 billion cubic feet of growing stock and 267.9 million cubic feet of cull (table 20).
- Hardwoods supply the majority of the growing-stock removals volume except in the Eastern Upper Peninsula where volume of softwood removals is slightly higher than that of hardwood removals.
- The growing-stock volume per acre harvested is 2,088 cubic feet, up 22 percent from Decade I.
- Softwood growing-stock harvest volume for the decade increased 21 percent to 1.7 million cubic feet; hardwood forest types now supply 39 percent of the softwood volume compared to 43 percent in Decade I (table 21).

Thinning

- Growing-stock volume per acre harvested is highest in stands 91-140 years old (table 22).
- More than 15 percent of the State's commercial forest land is targeted for thinning—in the Upper Peninsula 18 percent of the area is in this treatment category.
- Thirty-eight percent (2.4 million acres) of the maple-birch acreage has been selected for thinning along with 25 percent (171,200 acres) of the red pine acreage (table 23).
- During the decade, nearly 1.4 billion cubic feet of growing stock and 54.2 million cubic feet of cull are removed during thinning operations (table 24).
- An average of 518 cubic feet of growing stock is removed per acre of commercial forest land thinned (table 25).
- In the maple-birch forest type, thinning occurs in stands from 21-81 years old; in all other forest types, thinning occurs only in stands less than 51 years old (table 26).

Timber Stand Improvement

- In Decade II, t.s.i. occurs on 448,600 acres of commercial forest land, down 52 percent from that recorded in Decade I—the largest percentage decrease in t.s.i. area occurred in the Western Upper Peninsula (61 percent) (table 27).
- Timber stand improvement operations yield 20.2 million cubic feet of growing stock and 0.8 million cubic feet of cull during the decade (table 28).
- Softwood species account for a majority of the t.s.i. growing-stock volume.
- For most species, t.s.i. growing-stock volume is concentrated in sawtimber trees, except for balsam fir, soft maple, and quaking aspen species (table 29).
- The area qualifying for t.s.i. remains concentrated in the maple-birch forest type; growing-stock volume is concentrated in the northern white-cedar forest type (table 30).

Decade III (2001-2010)

The area projection for Decade III sets commercial forest area for the State at 17.2 million acres, down 51,100 acres from Decade II. In each Unit, the commercial forest area declines throughout the projection period except in the Northern Lower Peninsula. The fourth Michigan Forest Inventory showed 6,708,000 acres of commercial forest land in the Northern Lower Peninsula in 1980. We projected a 10,600-acre decline in the Unit area during the first decade of the projection period, followed by a 300-acre decline in the second decade. By the final decade of the projection, State forestry experts expect a halt in the decline in commercial forest area in the Northern Lower Peninsula and an actual increase in area (we estimate a 2,000-acre increase) as a result of planting and other reclamation efforts. Statewide, the red pine, white pine, northern white-cedar, and maple-birch forest types continue to show slight increases (an average of less than 1 percent) in commercial forest areas while the areas of all other types decline.

Treatments are assigned to 5.4 million acres of commercial forest land; no significant treatment is assigned to the remaining 11.8 million acres (table 31). Thinning is prescribed for 2.6 million acres, down 36,100 from that reported in Decade II. Only the Southern Lower Peninsula showed an increase in

thinning area, as the acreage in this treatment category jumped from 251,200 acres in Decade II to 347,800 in Decade III. The area harvested and thinned on commercial land declined slightly during the decade. There was a 29-percent decline in the t.s.i. area.

Harvest

- Harvest area in Decade III is 2.5 million acres, down 39,700 acres from Decade I and 13,400 acres from Decade II. An average of 15 percent of the commercial forest area is harvested in each decade.
- The average age of a harvested stand is 77 years; the youngest average harvest age occurs in the Northern Lower Peninsula (64 years). Despite a 21-percent decline in the average harvest age over the projection period, more than 62 percent of the harvest area in Decade III comes from overmature stands (table 32).
- Growing-stock yields from harvest total nearly 5.8 billion cubic feet for the decade, cull yields total nearly 282.9 million cubic feet (table 33).
- The average growing-stock volume per acre harvested is 2,289 cubic feet per acre (table 34).
- Thirty-six percent of the softwood growing-stock volume comes from hardwood forest types (table 35). Although this percentage is down from the first two decades, the total softwood volume supplied by hardwood forest types is up—from 604.4 million cubic feet in Decade I to 729.3 million cubic feet in Decade III.

Thinning

- Commercial forest area qualifying for thinning (2.6 million acres) continues to account for more than 15 percent of the commercial forest land base.
- Thirty-seven percent of the maple-birch forest type (2.4 million acres) qualifies for thinning in Decade III along with 19 percent of the red pine acreage (134,800 acres) and small portions of the oak-hickory (98,600 acres), white pine (2,900 acres), and white spruce (1,200 acres) forest type acreages (table 36).
- Thinning yields 1.6 billion cubic feet of growing stock and 51.3 million cubic feet of cull during the decade (table 37).
- The average growing-stock removals per acre thinned is 617 cubic feet per acre (table 38).
- The majority of the growing-stock thinning volume comes from maple-birch stands more than 60 years old (table 39).

Timber Stand Improvement

- The area of t.s.i. again declines between decades, down more than 29 percent from Decade II to 316,600 (table 40).
- During the decade, t.s.i. treatment opportunities yield 33.1 million cubic feet of growing-stock volume and 0.7 million cubic feet of cull (table 41).
- The average growing-stock volume removed per acre of commercial forest land undergoing t.s.i. is 104 cubic feet (tables 42, 43).

DISCUSSION

According to the assumptions and criteria outlined earlier, 17.8 million acres of Michigan's forests would qualify for treatment over the next 30 years. Between 1981 and 2010, final harvests would yield an estimated 15,426.5 million cubic feet of growing stock; thinning and t.s.i. would yield 4,240.6 million and 110 million cubic feet of growing stock, respectively. In this section we will: (1) compare our estimate of long-term timber supply to an estimate of long-term timber demand, (2) compare average annual removals in 1979 to average annual removals for the decade 1981-1990, (3) give examples of how forest managers and planners can modify the study results for a particular user or region, and (4) discuss sustainable yield in Michigan.

Long-Term Timber Supply and Demand

The predicted yields from harvest activities over the projection provide one estimate of long-term timber supply. This estimate is restricted by the assumptions and methods outlined earlier; however, given these restrictions and the management criteria specified, it is our best estimate of what is likely to happen in the future, using area control.

This estimate of long-term timber supply is of limited use without a comparison to projected long-term timber demand. The Market Analyst at the North Central Forest Experiment Station has estimated two levels of long-term timber demand for softwood and hardwood growing stock. Demand estimates show growing-stock removals increasing from 1979 levels at the annual rates shown on the next page.

Years	Percent change in the volume of growing-stock removals	
	Softwoods	Hardwoods
	High option	
1980-1984	2.5	1.3
1985-1989	4.6	2.6
1990-1994	6.2	2.9
1995-1999	4.8	2.5
2000-2004	3.6	2.3
2005-2010	3.2	2.2
	Low option	
1980-1984	(-)1.2	(-)1.0
1985-1989	1.0	1.2
1990-1994	3.6	2.7
1995-1999	4.0	2.3
2000-2004	3.1	2.0
2005-2010	2.5	1.8

These estimates of change in demand are based on predicted market response to economic forecasts.

A comparison between estimates of long-term timber supply and demand shows that growing-stock supply should exceed the high and low estimates of demand (fig. 2):

	STEMS estimate of long-term timber supply—average annual growing-stock removals		Analyst's estimate of long-term timber demand—average annual growing-stock removals	
	Harvest only	All treatments[2]	High	Low
	(Millions of cubic feet)			
Softwoods				
1981-1990	140.7	164.9	69.7	54.9
1991-2000	170.5	199.8	115.9	71.2
2001-2010	202.0	236.1	171.1	97.9
Hardwoods				
1981-1990	297.1	405.6	244.3	214.4
1991-2000	357.8	467.2	316.9	260.3
2001-2010	374.4	504.2	400.4	319.8

If the intensified management implied by our thinning and t.s.i. schedules is not achieved, we will be relying on harvest activities, alone, to supply growing-stock volume. There is a level of uncertainty implicit in these projections; however, the uncertainty surrounding our estimates of harvest areas and yields is probably less than that associated with the other treatment opportunities. If we look at potential growing-stock harvest volume (the solid line in figure 2), we find that projected demand under the high option will exceed potential harvest volume in the third decade of the projection. Relative to the high demand option, forest managers and planners should be alert to the possibility that shortages in growing-stock volume could occur early in the next century if intensified management activities, such as thinning and t.s.i., are not undertaken.

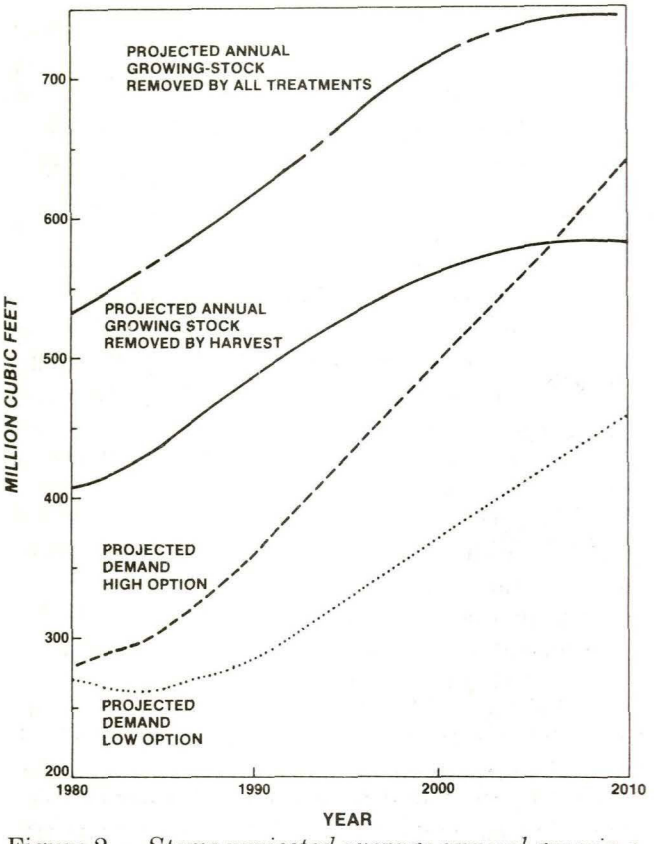

Figure 2.—*Stems projected average annual growing-stock harvest volume and low and high option demand projections, Michigan, 1980-2010.*

Average Annual Growing-Stock Removals 1979 vs 1981-1990

In the section on long-term timber supply and demand, we limited discussion to total softwood and total hardwood volumes for the entire State. This constraint was necessary because of the methods used to derive long-term timber demand. However, by limiting our analysis to only two species groups and the State as a whole, we may have masked important findings or considerations. For this reason it is useful to compare 1979 average annual growing-stock removals from the fourth Michigan Forest Inventory to average annual growing-stock removals for the decade 1981-1990 by species and Forest Survey Unit (table 44). This comparison shows that in 1979 growing-stock removals of several species already exceed average annual removals for Decade I and that opportunities exist for increasing average annual removals of other species.

Softwood Highlights

In 1979 jack pine accounted for 29 percent of the softwood growing-stock removal—in the Northern Lower Peninsula the species accounted for 52 percent of the total (Raile and Smith 1983). However, recent jack pine harvests may be exceeding desirable, or sustainable levels in some areas:

Survey unit	Jack pine average annual growing-stock removals		
	Reported 1979	STEMS estimate 1981-1990	
		Harvest only	All treatments[3]
	(Thousand cubic feet)		
Eastern Upper Peninsula	5,230	4,300	4,419
Western Upper Peninsula	2,889	2,197	2,351
Northern Lower Peninsula	7,999	8,457	9,958
Southern Lower Peninsula	74	346	366
State totals	16,192	15,300	17,094

In the Upper Peninsula more jack pine was cut in 1979 than is estimated to be available annually in Decade I for all treatments. In the Northern Lower Peninsula removals are approaching Decade I levels. Forest managers and planners will want to keep close track of what is happening to the jack pine resource in their areas to avoid possible problems in the future.

Red pine has long been a species favored by forest managers in the Lake States. Although disease problems have recently dampened some of the enthusiasm foresters have had for the species, inventory data indicate that red pine accounts for more than 13 percent of the softwood growing-stock inventory and 14 percent of the removals (Raile and Smith 1983). Our analysis shows that red pine removals can increase substantially in some areas while approaching long-term supply levels in other areas:

Survey unit	Red pine average annual growing-stock removals		
	Reported 1979	STEMS estimate 1981-1990	
		Harvest only	All treatments[3]
	(Thousand cubic feet)		
Eastern Upper Peninsula	1,422	3,497	4,443
Western Upper Peninsula	1,945	2,011	2,694
Northern Lower Peninsula	3,105	9,797	18,754
Southern Lower Peninsula	1,326	811	1,498
State totals	7,798	16,116	27,389

[3]*Includes harvest, thinning, and t.s.i.*

When 1979 average annual removals for balsam fir are compared to 1981-1990 average annual removals, it appears that there are opportunities for greatly increasing harvest levels. However, the STEMS projection system does not adequately account for catastrophic mortality, such as that caused by spruce budworm. For this reason projected balsam fir growing-stock removals may be overly optimistic for all treatments and decades.

Hardwood Highlights

In recent years the expansion of existing timber industries and establishment of new timber industries have relied, for the most part, on the State's aspen resource. In 1979, bigtooth and quaking aspen accounted for 38 percent of hardwood growing-stock removals and 30 percent of the total growing-stock removals (Raile and Smith 1983). Aspen growing-stock removals throughout the State should be monitored as current annual removals approach long-term supply:

Survey unit	Aspen average annual growing-stock removals		
	Reported 1979	STEMS estimate 1981-1990	
		Harvest only	All treatments[3]
	(Thousand cubic feet)		
Eastern Upper Peninsula	10,167	12,224	13,834
Western Upper Peninsula	26,302	17,797	21,587
Northern Lower Peninsula	45,229	43,926	47,311
Southern Lower Peninsula	1,497	4,204	4,865
State total	83,195	78,151	87,597

For some products, paper birch may be substituted for aspen. Throughout the State, paper birch growing-stock removals may be at least doubled before they reach long-term supply levels:

Survey unit	Paper birch average annual growing-stock removals		
	Reported 1979	STEMS estimate 1981-1990	
		Harvest only	All treatments[3]
	(Thousand cubic feet)		
Eastern Upper Peninsula	2,471	5,875	6,747
Western Upper Peninsula	2,574	6,672	7,526
Northern Lower Peninsula	2,579	7,198	8,503
Southern Lower Peninsula	110	233	269
State total	7,734	19,978	23,045

Fine-Tuning Study Assumptions to Reflect Local Resource Conditions

The treatments specified in this study may not be carried out for many reasons—timber management may be incompatible with owner objectives, markets may not exist for all of the material removed during treatments, physical features may limit the operability of certain stands, or administrative regulation may limit management options.

Forest managers and planners can use their knowledge of local conditions to modify this study's assumptions and criteria to the economics of management or to a particular user or region. In addition, statewide forest inventories provide data that may be used to strengthen the assumptions and criteria used here.

For example, road building costs can be a crucial factor in deciding whether to carry out a management activity (Milton 1981). According to the data collected during the fourth Michigan Forest Inventory, nearly 85 percent of the commercial forest land in the State is within 1 mile (linear air distance) of a maintained road and 38 percent of the commercial forest area is within one-fourth mile of a maintained road. If we look at the plots selected for treatment over the projection period, we find that these areas are distributed among distance-to-road classes in roughly the same proportion as the State's commercial forest area (Raile and Smith 1983):

	Distance to road (in miles)		
	0-¼	½-1	more than 1
	(Percent of area)		
Harvest area	36.2	45.9	17.9
Thinning area	39.2	48.5	12.3
T.s.i. area	39.5	48.1	12.4
Stand conversion or restocking area	42.1	42.9	15.0
Total commercial forest area (1980)	38.8	45.8	15.4

If the data user feels that distance to road is a factor that should not be overlooked when using the findings of this study, standard forest inventory data can be used to adjust the findings.

The stand area available for treatment can affect management decisions, particularly when the efficiency of the equipment being used is affected by economies of scale (Cubbage 1981). It appears that over the 30-year projection period, a disproportionate share of the stands qualifying for treatment occur as small blocks of land. Of the area qualifying for treatment over the projection period, nearly one-third occurs in stands less than 10 acres. Data from the 1980 Michigan Forest Inventory show that less than 10 percent of the total commercial forest area in the State is in stands less than 10 acres (Raile and Smith 1983). One explanation for this discrepancy is that currently, stands extending over large areas are being better managed than stands covering smaller areas. National forest and forest industry commercial forest holdings are concentrated in stands more than 80 acres. If we can assume that in these two ownerships forest management is practiced more often and at a higher level than in other ownerships, then it is reasonable to assume that these forests would require less management over the projection period than forests in other ownerships. Also, nonindustrial private owners who have stands covering large areas are probably more likely to be aware of and practice forest management activities. If stand area is an important input to a forest management decision, then the data user can assume that our treatment areas are distributed among stand area classes as follows:

Stand area class (acres)	Percent of treatment area
1-4	14.6
5-9	16.9
10-19	22.1
20-39	21.8
40-79	6.0
80-159	4.3
160-319	12.5
320+	1.8

Site quality is yet another factor that influences management decisions. For most management activities, the return per dollar invested will be greater from higher quality sites than from lower quality sites. The area of commercial forest land qualifying for treatment is distributed among site index classses in roughly the same proportion as the State's commercial forest area (Raile and Smith 1983):

	Site index		
	Less than 41	41-70	More than 70
	(Percent of area)		
Harvest area	11.3	60.3	28.4
Thinning area	0.7	57.4	41.9
T.s.i. area	9.4	65.4	25.2
Stand conversion of restocking area	16.0	67.7	16.3
Total commercial forest area (1980)	11.4	67.2	21.4

For all treatments the majority of the commercial forest area has a site index of 41-70; more area is on sites with a site index greater than 70 than where the site index is less than 40.

Sustained Yield for Michigan

By the year 2010, Michigan's average annual growing stock removals will be nearly 580 million cubic feet. Although growing-stock harvest volume may be approaching sustainable yield, opportunities exist for further increasing the State's wood-fiber potential.

Empirical yield estimates from stands currently at rotation age indicate that sustainable growing-stock volumes from the area control harvest acreage would total 373 million cubic feet annually. However, if we use estimates of yields from published yield tables for well-stocked stands, a potential growing-stock harvest volume of 580 million cubic feet could be achieved for the area control acreage. Thus, under area control, the sustained growing-stock yields from harvest operations in Michigan's forests should fall between 373 million cubic feet and 580 million cubic feet per year. The lower figure indicates minimal management activity and the higher figure indicates more intense management.

Growing-stock volumes will also be available from thinning and t.s.i. operations. In Decade III, growing-stock removals from these activities totaled 164 million cubic feet. Estimates of the sustainable thinning and t.s.i. contributions to growing-stock harvest volume under area control fall between 93 million cubic feet and 145 million cubic feet annually. Thus, the total annual sustainable growing-stock yield from all harvest, thinning, and t.s.i. management opportunities on stocked stands would fall between 466 million cubic feet and 725 million cubic feet annually under area control.

The volumes shown in this report only account for the wood fiber in the boles of growing-stock trees. Research indicates that the volume in the tops and limbs of growing-stock trees is equal to approximately 45 percent of the bole volume. Therefore, utilizing tops and limbs could increase total yields to between 676 million cubic feet and 1,051 million cubic feet of wood fiber annually.

Another major opportunity lies in more complete utilization of nonstocked and poorly stocked commercial forest land. If we assume an average rotation age of 60 years for Michigan's 947,400 acres of nonstocked and poorly stocked commercial forest land, an additional 15,790 acres could be placed on rotation annually. The yields from the harvest of growing-stock boles, tops, and limbs on this area could total between 35 million cubic feet and 52 million cubic feet annually.

Finally, harvest, thinning, and t.s.i. activities are not restricted to growing-stock trees. Non-growing-stock material (shortlog and rough and rotten trees) currently accounts for roughly 5 percent of all harvest volume. Adjustments for non-growing-stock removals, including tops and limbs, would increase our estimate of total sustainable yield to between 710 million cubic feet and 1,104 million cubic feet of fiber annually.

This final estimate of sustained yield does not take into account the potential for increased yield realized by shifting marginal stands to more productive species. It does reflect assumptions outlined earlier.

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APPENDIX

TREE SPECIES GROUPS[4]

- Softwoods
  - Eastern white pine — *Pinus strobus*
  - Red pine — *Pinus resinosa*
  - Jack pine — *Pinus banksiana*
  - White spruce — *Picea glauca*
  - Black spruce — *Picea mariana*
  - Balsam fir — *Abies balsamea*
  - Eastern hemlock — *Tsuga canadensis*
  - Tamarack — *Larix laricina*
  - Northern white-cedar — *Thuja occidentalis*
  - Other softwoods
    - Eastern redcedar — *Juniperus virginiana*
    - Norway spruce — *Picea abies*
    - Austrian pine — *Pinus nigra*
    - Scotch pine — *Pinus sylvestris*
- Hardwoods
  - White oaks
    - White oak — *Quercus alba*
    - Swamp white oak — *Quercus bicolor*
    - Bur oak — *Quercus macrocarpa*
    - Chestnut oak — *Quercus prinus*
  - Select red oak
    - Northern red oak — *Quercus rubra*
  - Other red oaks
    - Scarlet oak — *Quercus coccinea*
    - Northern pin oak — *Quercus ellipsoidalis*
    - Black oak — *Quercus velutina*
  - Hickories
    - Shagbark hickory — *Carya ovata*
    - Bitternut hickory — *Carya cordiformis*
  - Yellow birch — *Betula alleghaniensis*
  - Hard maple
    - Sugar maple — *Acer saccharum*
  - Soft maples
    - Red maple — *Acer rubrum*
    - Silver maple — *Acer saccharinum*
  - American beech — *Fagus grandifolia*
  - Ashes
    - White ash — *Fraxinus americana*
    - Black ash — *Fraxinus nigra*
    - Green ash — *Fraxinus pennsylvanica*
  - Balsam poplar — *Populus balsamifera*
  - Eastern cottonwood — *Populus deltoides*
  - Aspens
    - Bigtooth aspen — *Populus grandidentata*
    - Quaking aspen — *Populus tremuloides*
  - Basswood — *Tilia americana*
  - Black cherry — *Prunus serotina*
  - Elms
    - American elm — *Ulmus americana*
    - Slippery elm — *Ulmus rubra*
    - Rock elm — *Ulmus thomasii*
  - Paper birch — *Betula papyrifera*
  - Other hardwoods
    - Black walnut — *Juglans nigra*
    - Butternut — *Juglans cinerea*
    - Honeylocust — *Gleditsia triacanthos*
    - Sassafras — *Sassafras albidum*
    - River birch — *Betula nigra*
    - American chestnut — *Castanea dentata*
    - Sycamore — *Platanus occidentalis*
    - Black tupelo — *Nyssa sylvatica* var. *sylvatica*
    - Red mulberry — *Morus rubra*
    - Black willow — *Salix nigra*
- Noncommercial species
  - Eastern hophornbeam — *Ostrya virginiana*
  - Peachleaf willow — *Salix amygdaloides*
  - American hornbeam — *Carpinus caroliniana*
  - Hawthorn — *Crataegus spp.*
  - Striped maple — *Acer pensylvanicum*
  - Mountain-ash — *Sorbus spp.*
  - Pin cherry — *Prunus pensylvanica*
  - Chokecherry — *Prunus virginia*

[4]*The common and scientific names are based on: Little, Elbert L. Check list of native and naturalized trees of the United States. Agric. Handb. 541. Washington, D.C.: U.S. Department of Agriculture, Forest Service; 1979. 375 p.*

METRIC EQUIVALENTS OF UNITS USED IN THIS REPORT

1 acre = 4,046.86 square meters or 0.405 hectare
1,000 acres = 405 hectares
1 cubic foot = 0.0283 cubic meter
1 foot = 30.48 centimeters or 0.3048 meter
1 inch = 25.4 millimeters, 2.54 centimeters, or 0.0254 meter
1 pound = 0.454 kilogram
1 ton = 0.907 metric ton

DEFINITION OF TERMS

Acceptable trees.—Growing-stock trees of commercial species that meet specified standards of size and quality but do not qualify as desirable trees.

Basal area.—The area in square feet of the cross section at breast height of a single tree. When the basal area of all trees in a stand are summed, the result is usually expressed as square feet of basal area per acre.

Commercial forest land.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commerical forest land have the capability of producing in excess of 20 cubic feet per acre per year of annual growth under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.)

Desirable trees.—Growing-stock trees having no serious defects in quality limiting present or prospective use, and of relatively high vigor, and containing no pathogens that may result in death or serious deterioration before rotation age. These are trees that would be favored by forest managers in silvicultural operations.

Forest type.—A classification of forest land based upon the species forming a plurality of live tree stocking. Major forest types in Michigan are:

Jack pine.—Forests in which jack pine comprises a plurality of the stocking. (Common associates include eastern white pine, red pine, aspen, birch, and maple.)

Red pine.—Forests in which red pine comprises a plurality of the stocking. (Common associates include eastern white pine, jack pine, aspen, birch, and maple.)

White pine.—Forests in which eastern white pine comprises a plurality of the stocking. (Common associates include red pine, jack pine, aspen, birch, and maple.)

Balsam fir.—Forests in which balsam fir and white spruce comprise a plurality of stocking with balsam fir the most common. (Common associates include white spruce, aspen, maple, birch, northern white-cedar, and tamarack.)

White spruce.—Forests in which white spruce and balsam fir comprise a plurality of the stocking with white spruce the most common. (Common associates include balsam fir, aspen, maple, birch, northern white-cedar, and tamarack.)

Black spruce.—Forests in which swamp conifers comprise a plurality of the stocking with black spruce the most common. (Common associates include tamarack and northern white-cedar.)

Northern white-cedar.—Forests in which swamp conifers comprise a plurality of the stocking with northern white-cedar the most common. (Common associates include tamarack and black spruce.)

Tamarack.—Forests in which swamp conifers comprise a plurality of the stocking with tamarack the most common. (Common associates include black spruce and northern white-cedar.)

Oak-hickory.—Forests in which northern red oak, white oak, bur oak, or hickories, singly or in combination, comprise a plurality of the stocking. (Common associates include jack pine, beech, yellow-poplar, elm, and maple.)

Elm-ash-maple.—Forests in which lowland elm, ash, cottonwood, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include birches, spruce, and balsam fir.)

Maple-birch.—Forests in which sugar maple, basswood, American beech, yellow birch, upland American elm, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include white pine, elm, hemlock, and basswood.)

Aspen.—Forests in which quaking aspen or bigtooth aspen, singly or in combination, comprise a plurality of the stocking. (Common associates include balsam poplar, balsam fir, and paper birch.)

Paper birch.—Forests in which paper birch comprises a plurality of the stocking. (Common associates include maple, aspen, and balsam fir.)

Exotic.—Forests in which species not native to Michigan comprise a plurality of the stocking. (Mostly scotch pine plantations.)

Growing-stock trees.—Live trees of commercial species qualifying as desirable and acceptable trees. (Note: Excludes rough, rotten, and dead trees.)

Growing-stock volume.—Net volume in cubic feet of growing stock trees 5.0 inches d.b.h. and over, from a 1-foot stump to a minimum 4.0 inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs. Cubic feet can be converted to cords by dividing by 79 cubic feet per solid wood cord.

Hardwoods.—Dicotyledonous trees, usually broad-leaved and deciduous.

Maintained road.—Any road, hard-topped or other surfaces, that is plowed or graded at least once a year. Includes rights-of-way that are cut or treated to limit herbaceous growth.

Net volume.—Gross volume less deductions for rot, sweep, or other defect affecting use for timber products.

Ownership.—Property owned by one owner, regardless of the number of parcels in a specified area.

Poletimber trees.—Growing-stock trees of commercial species at least 5.0 inches d.b.h., but smaller than sawtimber size.

Rotten trees.—Live trees of commercial species that do not contain at least one 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, and/or do not meet Regional specifications for free-

dom from defect primarily because of rot; that is, when more than 50 percent of the cull volume in a tree is rotten.

Rough trees.—(a) Live trees of commercial species that do not contain at least one merchantable 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, and/or do not meet Regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Sawtimber trees.—Growing-stock trees of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting Regional specifications for freedom from defect. Softwoods must be at least 9.0 inches d.b.h. Hardwoods must be at least 11.0 inches d.b.h.

Short-log (rough tree).—Sawtimber-size trees of commercial species that contain at least one merchantable 8- to 11-foot saw log but not a 12-foot saw log.

Site index.—An expression of forest site quality based on the height of a free-growing dominant or codominant tree of a representative species in the forest type at age 50.

Softwoods.—Coniferous trees, usually evergreen, having needles or scale-like leaves.

Stand.—A growth of trees on a minimum of 1 acre of forest land that is stocked by forest trees of any size.

Stand-age class.—Age of the main stand. Main stand refers to trees of the dominant forest type and stand-size class.

Stand-area class.—The extent of a continuous forested area of the same forest type, stand-size class, and stand-density class.

State land.—Land owned by States, or land leased to these governmental units for 50 years or more.

Stocking.—The degree of occupancy of land by trees, measured by basal area and/or the number of trees in a stand by size or age and spacing, compared to the basal area and/or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

A stocking percent of 100 indicates full utilization of the site and is equivalent to 80 square feet of basal area per acre in trees 5 inches d.b.h. and larger. In a stand of trees less than 5 inches d.b.h., a stocking percent of 100 would indicate that the present number of trees is sufficient to produce 80 square feet of basal area per acre when the trees reach 5 inches d.b.h.

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Table 1.--Management criteria, Michigan, 1981-2010

Forest type	Rotation age	Basal area for thinning	Post thinning basal area	Timber stand improvement[1/]
	years	square feet		
Jack pine	50	no		yes
Red pine	60	140	90	yes
White pine	80	140	90	yes
White spruce	60	STEMS[1/]		yes
Black spruce	70	no		no
Balsam fir	50	STEMS[1/]		yes
Tamarack	60	no		no
Northern white-cedar	80	no		yes
Oak-hickory	70	STEMS[1/]		yes
Elm-ash-maple	70	no		no
Maple-birch	90	STEMS[1/]		yes
Aspen	40	no		no
Paper birch	50	no		no
Exotic	60	no		no

[1/] Used management criteria built in to the Stand and Tree Evaluating and Modeling System (STEMS). See Brand, Gary J. 1981. Simulating Timber Management in Lake States Forests. USDA Forest Service, North Central Forest Experiment Station, GTR NC-69, 25 p.

Table 2.--Area of commercial forest land, 1966[1/] 1980, and projections of commercial forest area, 1981-2010, by forest type, Michigan[2/]

(In thousand acres)

Forest type	1966	1980	Projections		
			1985	1995	2005
Jack pine	883.5	836.7	831.1	826.0	823.5
Red pine	594.8	656.0	677.4	693.9	701.9
White pine	147.9	214.2	217.2	221.3	224.7
White spruce	172.7	100.1	91.3	85.6	83.2
Black spruce	421.1	520.7	520.3	520.1	520.0
Balsam fir	899.2	635.3	605.9	578.4	565.8
Tamarack	162.8	114.8	108.6	102.5	99.6
Northern white-cedar	1,160.5	1,173.6	1,187.7	1,203.0	1,211.0
Oak-hickory	2,273.2	1,773.7	1,734.2	1,690.8	1,655.6
Elm-ash-maple	1,781.1	1,326.3	1,260.1	1,198.1	1,168.5
Maple-birch	5,203.2	6,098.2	6,196.9	6,293.1	6,352.5
Aspen	4,128.8	3,406.7	3,328.7	3,248.9	3,210.2
Paper birch	403.9	374.8	365.9	357.8	354.0
Exotic	118.2	86.2	89.6	87.3	86.0
Nonstocked	538.4	172.3	165.2	164.1	163.3
All types	18,889.3	17,489.5	17,380.1	17,270.9	17,219.8

[1/] Area has been adjusted from those published after the 1966 survey to conform to 1980 areas because of changes in survey procedures and definitions.

[2/] Table may not add to totals due to rounding.

Table 3.--Commercial forest area qualifying for stand conversion or restocking by forest type and Forest Survey Unit, Michigan, 1980[1/]

(In thousand acres)

Forest type	All units	Forest Survey Unit			
		Eastern Upper Peninsula	Western Upper Peninsula	Northern Lower Peninsula	Southern Lower Peninsula
Jack pine	65.6	27.1	2.9	35.6	--
Red pine	37.9	10.7	--	27.2	--
White pine	16.9	6.3	1.7	4.0	4.9
White spruce	7.9	4.9	--	3.0	--
Black spruce	56.0	35.0	14.8	6.2	--
Balsam fir	25.7	4.1	18.6	3.0	--
Tamarack	11.4	4.4	2.1	4.9	--
Northern white-cedar	17.3	9.5	--	4.5	3.3
Oak-hickory	78.1	1.6	--	46.6	29.9
Elm-ash-maple	112.7	8.3	5.5	48.4	50.5
Maple-birch	161.3	12.7	2.6	67.4	78.6
Aspen	169.4	39.8	32.8	86.6	10.2
Paper birch	11.5	3.0	4.2	4.3	--
Exotic	3.5	--	--	3.5	--
Nonstocked	172.2	40.2	28.7	63.2	40.1
All types	947.4	207.6	113.9	408.4	217.5

[1/] Table may not add to totals due to rounding.

Table 4.--Growing-stock volume on stands selected for stand conversion or restocking by species group, tree class, and Forest Survey Unit, Michigan, 1980[1/]

(In thousand cubic feet)

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
ALL UNITS						
SOFTWOODS						
Jack pine	18,021	9,088	8,933	996	90	906
Red pine	13,633	2,909	10,724	94	60	34
White pine	9,506	1,009	8,497	1,367	--	1,367
White spruce	3,572	1,273	2,299	720	--	720
Black spruce	9,447	5,089	4,358	81	--	81
Balsam fir	4,924	2,637	2,287	81	81	--
Hemlock	--	--	--	20	--	20
Tamarack	6,925	3,830	3,095	415	60	355
Northern white-cedar	4,103	2,047	2,056	610	--	610
Other softwoods	2,540	2,030	510	826	200	626
Total	72,671	29,912	42,759	5,210	491	4,719
HARDWOODS						
White oak	10,060	3,680	6,380	410	150	260
Select red oak	16,718	3,217	13,501	1,320	730	590
Other red oak	4,420	1,410	3,010	350	100	250
Hickory	1,220	210	1,010	--	--	--
Basswood	3,020	440	2,580	--	--	--
Beech	610	400	210	500	340	160
Yellow birch	100	--	100	50	--	50
Hard maple	7,770	2,780	4,990	4,090	1,048	3,042
Soft maple	26,868	8,418	18,450	4,548	347	4,201
Elm	7,833	4,573	3,260	2,224	178	2,046
Ash	12,665	7,947	4,718	1,128	--	1,128
Cottonwood	1,870	790	1,080	--	--	--
Balsam poplar	8,072	1,878	6,194	415	110	305
Bigtooth aspen	4,734	2,624	2,110	341	--	341
Quaking aspen	30,092	12,934	17,158	5,479	1,038	4,441
Paper birch	6,798	3,707	3,091	1,046	80	966
Black cherry	9,452	4,348	5,104	4,200	--	4,200
Other hardwoods	10,050	390	9,660	790	--	790
Total	162,352	59,746	102,606	26,890	4,121	22,770
All species	235,023	89,658	145,365	32,101	4,612	27,489
EASTERN UPPER PENINSULA						
SOFTWOODS						
Jack pine	8,531	4,098	4,433	347	90	257
Red pine	4,392	795	3,597	94	60	34
White pine	4,750	503	4,247	1,127	--	1,127
White spruce	2,032	763	1,269	--	--	--
Black spruce	7,337	3,099	4,238	41	--	41
Balsam fir	1,454	867	587	--	--	--
Tamarack	2,545	1,300	1,245	50	--	50
Northern white-cedar	1,993	787	1,206	358	--	358
Total	33,034	12,212	20,822	2,017	150	1,867
HARDWOODS						
Select red oak	900	--	900	--	--	--
Basswood	150	--	150	--	--	--
Yellow birch	--	--	--	50	--	50
Hard maple	2,600	1,010	1,590	110	--	110
Soft maple	2,443	1,436	1,007	931	--	931
Elm	390	130	260	156	--	156
Ash	1,360	1,130	230	77	--	77
Balsam poplar	1,802	738	1,064	145	110	35
Bigtooth aspen	764	364	400	41	--	41
Quaking aspen	6,215	3,377	2,838	720	--	720
Paper birch	1,736	725	1,011	6	--	6
Black cherry	100	100	--	--	--	--
Total	18,460	9,010	9,450	2,236	110	2,126
All species	51,494	21,222	30,272	4,253	260	3,993

(Table 4 continued on next page)

(Table 4 continued)

Species group	Tree class: Growing stock: Total	Growing stock: Pole-timber	Growing stock: Saw-timber	Cull: Total	Cull: Shortlog	Cull: Other[2/]
WESTERN UPPER PENINSULA						
SOFTWOODS						
Jack pine	1,076	736	340	--	--	--
Red pine	1,720	710	1,010	--	--	--
White pine	986	56	930	170	--	170
White spruce	1,300	270	1,030	720	--	720
Black spruce	1,590	1,590	--	40	--	40
Balsam fir	3,000	1,500	1,500	--	--	--
Hemlock	--	--	--	20	--	20
Tamarack	770	390	380	60	--	60
Northern white-cedar	450	370	80	--	--	--
Total	10,892	5,622	5,270	1,010	--	1,010
HARDWOODS						
Select red oak	730	350	380	--	--	--
Yellow birch	100	--	100	--	--	--
Hard maple	380	270	110	190	--	190
Soft maple	790	430	360	280	90	190
Elm	440	90	350	100	100	--
Ash	260	--	260	90	--	90
Balsam poplar	2,000	190	1,810	--	--	--
Quaking aspen	5,957	2,637	3,320	2,478	430	2,048
Paper birch	1,442	822	620	200	80	120
Black cherry	100	100	--	230	--	230
Total	12,199	4,889	7,310	3,568	700	2,868
All species	23,091	10,511	12,580	4,578	700	3,878
NORTHERN LOWER PENINSULA						
SOFTWOODS						
Jack pine	8,414	4,254	4,160	649	--	649
Red pine	6,331	1,404	4,927	--	--	--
White pine	3,480	450	3,030	70	--	70
White spruce	240	240	--	--	--	--
Black spruce	520	400	120	--	--	--
Balsam fir	470	270	200	81	81	--
Tamarack	2,610	1,720	890	215	60	155
Northern white-cedar	1,660	890	770	252	--	252
Other softwoods	2,150	2,030	120	46	--	46
Total	25,875	11,658	14,217	1,313	141	1,172
HARDWOODS						
White oak	6,450	3,680	2,770	150	150	--
Select red oak	13,428	2,867	10,561	890	300	590
Other red oak	2,410	710	1,700	180	100	80
Basswood	1,060	--	1,060	--	--	--
Beech	610	400	210	160	--	160
Hard maple	2,460	1,130	1,330	2,771	468	2,303
Soft maple	15,575	4,882	10,693	2,767	257	2,510
Elm	1470	950	520	441	--	441
Ash	5,615	3,837	1,778	231	--	231
Balsam poplar	2,100	480	1,620	130	--	130
Bigtooth aspen	3,740	2,030	1,710	300	--	300
Quaking aspen	16,950	6,340	10,610	2,281	608	1,673
Paper birch	2,920	1,610	1,310	720	--	720
Black cherry	4,222	2,348	1,874	2,140	--	2,140
Other hardwoods	740	--	740	290	--	290
Total	79,750	31,264	48,486	13,451	1,883	11,568
All species	105,625	42,922	62,703	14,764	2,024	12,740

(Table 4 continued on next page)

(Table 4 continued)

SOUTHERN LOWER PENINSULA

Species group	Tree class: Growing stock: Total	Growing stock: Pole-timber	Growing stock: Saw-timber	Cull: Total	Cull: Shortlog	Cull: Other[2]
SOFTWOODS						
Red pine	1,190	--	1,190	--	--	--
White pine	290	--	290	--	--	--
Tamarack	1,000	420	580	90	--	90
Other softwoods	390	--	390	780	200	580
Total	2,870	420	2,450	870	200	670
HARDWOODS						
White oak	3,610	--	3,610	260	--	260
Select red oak	1,660	--	1,660	430	430	--
Other red oak	2,010	700	1,310	170	--	170
Hickory	1,220	210	1,010	--	--	--
Basswood	1,810	440	1,370	--	--	--
Beech	--	--	--	340	340	--
Hard maple	2,330	370	1,960	1,019	580	439
Soft maple	8,060	1,670	6,390	570	--	570
Elm	5,533	3,403	2,130	1,527	78	1,449
Ash	5,430	2,980	2,450	730	--	730
Cottonwood	1,870	790	1,080	--	--	--
Balsam poplar	2,170	470	1,700	140	--	140
Bigtooth aspen	230	230	--	--	--	--
Quaking aspen	970	580	390	--	--	--
Paper birch	700	550	150	120	--	120
Black cherry	5,030	1,800	3,230	1,830	--	1,830
Other hardwoods	9,310	390	8,920	500	0	500
Total	51,943	14,583	37,360	7,635	1,428	6,208
All species	54,813	15,003	39,810	8,506	1,628	6,878

[1] Tables may not add to totals due to rounding.
[2] Rough and rotten cull.

Table 5.--Commercial forest area qualifying for treatment and average annual yields of growing stock from each treatment by treatment category and Survey Unit, Michigan, 1981-1990[1]

COMMERCIAL FOREST AREA

Treatment	All units	Forest Survey Unit: Eastern Upper Peninsula	Western Upper Peninsula	Northern Lower Peninsula	Southern Lower Peninsula
		In thousand acres			
Harvest	2,557.3	556.3	650.0	1,050.3	300.7
Thinning	2,318.4	442.6	849.4	795.4	231.0
Timber stand improvement	927.1	176.1	314.1	327.3	109.6
Stand conversion or restocking	947.4	207.6	113.9	408.4	217.5
No treatment	10,629.9	2,378.0	2,557.9	4,116.0	1,578.0
Total	17,380.1	3,760.6	4,485.3	6,697.4	2,436.8
AVERAGE ANNUAL YIELDS OF GROWING STOCK					
		In thousand cubic feet			
Harvest	437,871	89,821	118,702	175,239	54,109
Thinning	126,944	23,885	46,004	48,424	8,631
Timber stand improvement	5,687	2,110	1,679	1,585	313
Total	570,502	115,816	166,385	225,248	63,053

[1] Tables may not add to totals due to rounding.

Table 6.--Commercial forest area qualifying for harvest by forest type, stand-age class, and Forest Survey Unit, Michigan, 1981-1990[1/]

(In thousand acres)

ALL UNITS

Forest type	All ages	Stand-age class (years)										
		1-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	149.8	--	--	--	54.6	36.7	34.7	14.6	4.4	2.3	2.5	--
Red pine	105.9	--	--	27.9	7.5	17.6	14.7	10.9	7.5	18.2	1.5	--
White pine	25.0	--	--	--	--	--	2.2	--	2.1	3.4	12.8	4.7
White spruce	12.8	--	--	--	--	--	--	2.4	--	8.2	--	2.2
Black spruce	65.4	--	--	--	4.3	14.6	9.4	3.2	7.5	13.3	7.3	5.8
Balsam fir	116.0	--	--	--	9.6	12.2	22.4	17.8	14.6	23.6	11.0	4.8
Tamarack	14.7	--	--	--	--	2.5	1.5	1.5	3.2	3.7	--	2.3
Northern white-cedar	145.2	--	--	--	--	--	0.7	--	--	23.8	63.3	57.3
Oak-hickory	235.2	--	--	--	--	--	--	--	49.9	129.7	44.3	11.3
Elm-ash-maple	159.9	--	--	--	--	--	--	--	19.9	83.4	40.7	15.9
Maple-birch	663.6	--	--	--	--	--	--	--	88.7	218.4	271.7	84.9
Aspen	779.5	--	--	6.5	175.5	228.3	148.7	94.7	66.9	50.2	8.7	--
Paper birch	70.2	--	1.2	--	--	16.3	23.1	8.1	11.9	3.0	4.9	1.6
Exotic	14.1	--	4.8	2.2	7.1	--	--	--	--	--	--	--
All types	2,557.3	--	6.0	36.7	258.4	328.1	257.6	153.3	276.5	581.2	468.7	190.8
EASTERN UPPER PENINSULA												
Jack pine	38.2	--	--	--	18.3	11.2	5.7	3.1	--	--	--	--
Red pine	22.9	--	--	1.1	3.1	6.0	6.2	1.5	1.6	3.4	--	--
White pine	8.0	--	--	--	--	--	--	--	--	0.3	4.6	3.1
White spruce	3.9	--	--	--	--	--	--	2.4	--	1.5	--	--
Black spruce	34.8	--	--	--	4.3	14.6	4.7	3.2	4.7	1.6	--	1.8
Balsam fir	39.9	--	--	--	9.6	12.2	5.9	1.4	1.5	6.3	3.0	--
Tamarack	6.0	--	--	--	--	--	1.5	1.5	1.6	1.4	--	--
Northern white-cedar	74.7	--	--	--	--	--	--	--	--	14.3	35.2	25.2
Oak-hickory	2.5	--	--	--	--	--	--	--	0.9	--	1.6	--
Elm-ash-maple	23.9	--	--	--	--	--	--	--	--	13.8	7.0	3.0
Maple-birch	126.6	--	--	--	--	--	--	--	--	33.3	67.4	25.9
Aspen	153.6	--	--	--	52.2	48.4	12.3	12.0	20.1	8.5	--	--
Paper birch	21.5	--	--	--	--	7.7	7.6	--	3.1	3.0	--	--
All types	556.3	--	--	1.1	87.4	100.1	43.9	25.1	33.5	87.6	118.7	58.9

(Table 6 continued on next page)

(Table 6 continued)

Forest type	All ages	Stand-age class (years)										
		1-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
WESTERN UPPER PENINSULA												
Jack pine	15.8	--	--	--	4.5	4.7	3.1	1.7	1.7	--	--	--
Red pine	9.6	--	--	--	--	--	--	--	1.5	6.5	1.5	--
White pine	5.5	--	--	--	--	--	--	--	--	0.6	3.3	1.6
White spruce	6.7	--	--	--	--	--	--	--	--	6.7	--	--
Black spruce	27.5	--	--	--	--	--	1.7	--	2.8	11.7	7.3	4.0
Balsam fir	68.5	--	--	--	--	--	16.5	16.1	13.1	15.0	2.9	4.8
Tamarack	5.2	--	--	--	--	1.3	--	--	1.6	--	--	2.3
Northern white-cedar	25.8	--	--	--	--	--	--	--	--	--	11.2	14.5
Oak-hickory	2.6	--	--	--	--	--	--	--	--	1.0	1.6	--
Elm-ash-maple	22.0	--	--	--	--	--	--	--	--	--	9.1	12.9
Maple-birch	266.1	--	--	--	--	--	--	--	--	41.6	165.6	59.0
Aspen	166.8	--	--	--	32.6	46.8	50.2	24.5	5.1	7.6	--	--
Paper birch	27.9	--	--	--	--	--	6.7	8.1	6.6	--	4.9	1.6
All types	650.0	--	--	--	37.1	52.8	78.2	50.4	32.4	90.7	207.5	100.8
NORTHERN LOWER PENINSULA												
Jack pine	93.3	--	--	--	31.8	18.2	26.0	9.9	2.7	2.3	2.5	--
Red pine	68.8	--	--	22.2	4.4	11.7	8.5	9.4	4.4	8.2	--	--
White pine	9.4	--	--	--	--	--	--	--	2.1	2.5	4.9	--
White spruce	2.2	--	--	--	--	--	--	--	--	--	--	2.2
Black spruce	3.1	--	--	--	--	--	3.0	--	--	--	--	--
Balsam fir	7.6	--	--	--	--	--	--	0.2	--	2.3	5.1	--
Tamarack	3.4	--	--	--	--	1.2	--	--	--	2.3	--	--
Northern white-cedar	43.9	--	--	--	--	--	--	--	--	9.3	16.9	17.6
Oak-hickory	141.4	--	--	--	--	--	--	--	49.0	72.4	17.6	2.4
Elm-ash-maple	46.8	--	--	--	--	--	--	--	7.7	23.0	16.1	--
Maple-birch	181.0	--	--	--	--	--	--	--	74.6	86.5	19.9	--
Aspen	420.9	--	--	--	79.8	117.1	81.4	58.2	41.7	34.0	8.7	--
Paper birch	19.6	--	--	--	--	8.5	8.7	0.1	2.3	--	--	--
Exotic	9.0	--	4.5	2.2	2.2	--	--	--	--	--	--	--
All types	1,050.3	--	4.5	24.4	118.2	156.7	127.6	77.8	184.4	242.8	91.7	22.2
SOUTHERN LOWER PENINSULA												
Jack pine	2.5	--	--	--	--	2.5	--	--	--	--	--	--
Red pine	4.6	--	--	4.6	--	--	--	--	--	--	--	--
White pine	2.2	--	--	--	--	--	2.2	--	--	--	--	--
Northern white-cedar	0.9	--	--	--	--	--	0.7	--	--	0.2	--	--
Oak-hickory	88.7	--	--	--	--	--	--	--	--	56.3	23.5	8.9
Elm-ash-maple	67.3	--	--	--	--	--	--	--	12.2	46.6	8.5	--
Maple-birch	90.0	--	--	--	--	--	--	--	14.1	57.0	18.8	--
Aspen	38.3	--	--	6.5	10.9	15.9	4.9	--	--	--	--	--
Paper birch	1.2	--	1.2	--	--	--	--	--	--	--	--	--
Exotic	5.1	--	0.3	--	4.8	--	--	--	--	--	--	--
All types	300.7	--	1.5	11.2	15.8	18.4	7.8	--	26.3	160.1	50.8	8.9

[1/] Tables may not add to totals due to rounding.

Table 7.--Average annual yields from harvest by species group, tree class, and Forest Survey Unit, Michigan, 1981-1990[1/]

(In thousand cubic feet)

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
ALL UNITS						
SOFTWOODS						
Jack pine	15,300	6,377	8,923	280	56	224
Red pine	16,116	2,439	13,677	45	23	22
White pine	20,208	1,377	18,831	157	89	68
White spruce	10,721	2,045	8,676	83	38	45
Black spruce	5,503	4,160	1,343	44	4	40
Balsam fir	19,119	11,578	7,541	208	44	164
Hemlock	14,573	1,413	13,160	623	213	410
Tamarack	1,458	659	799	53	--	53
Northern white-cedar	36,230	13,855	22,375	3,952	955	2,997
Other softwoods	1,513	670	843	99	--	99
Total	140,741	44,573	96,168	5,544	1,422	4,122
HARDWOODS						
White oak	11,761	1,850	9,911	413	92	321
Select red oak	28,859	2,806	26,053	1,050	343	707
Other red oak	4,099	196	3,903	192	64	128
Hickory	1,804	265	1,539	--	--	--
Basswood	8,787	1,553	7,234	356	44	312
Beech	8,459	1,083	7,376	1,312	307	1,005
Yellow birch	10,154	1,329	8,825	1,325	370	955
Hard maple	46,786	10,412	36,374	2,617	696	1,921
Soft maple	45,197	13,921	31,276	2,571	552	2,019
Elm	3,329	1,079	2,250	87	12	75
Ash	12,650	4,055	8,595	380	41	339
Cottonwood	2,390	19	2,371	15	--	15
Balsam poplar	8,946	897	8,049	369	54	315
Bigtooth aspen	30,512	6,131	24,381	1,193	104	1,089
Quaking aspen	47,639	9,338	38,301	4,071	604	3,467
Paper birch	19,978	8,103	11,875	1,240	243	997
Black cherry	3,789	1,240	2,549	344	148	196
Other hardwoods	1,991	332	1,659	304	4	300
Total	297,130	64,609	232,521	17,839	3,678	14,161
All species	437,871	109,182	328,689	23,383	5,100	18,283
EASTERN UPPER PENINSULA						
SOFTWOODS						
Jack pine	4,300	1,838	2,462	78	7	71
Red pine	3,497	258	3,239	--	--	--
White pine	4,819	294	4,525	58	33	25
White spruce	2,917	531	2,386	27	21	6
Black spruce	3,364	2,838	526	37	4	33
Balsam fir	6,365	4,369	1,996	69	14	55
Hemlock	3,909	350	3,559	221	79	142
Tamarack	583	373	210	--	--	--
Northern white-cedar	14,709	6,203	8,506	1,439	347	1,092
Total	44,463	17,054	27,409	1,929	505	1,424
HARDWOODS						
Select red oak	374	47	327	25	--	25
Basswood	224	25	199	63	20	43
Beech	4,166	602	3,564	535	111	424
Yellow birch	2,821	265	2,556	248	67	181
Hard maple	6,390	1,249	5,141	308	84	224
Soft maple	8,837	2,735	6,102	631	156	475
Elm	402	47	355	12	--	12
Ash	905	523	382	38	10	28
Balsam poplar	2,876	325	2,551	120	34	86
Bigtooth aspen	2,158	854	1,304	161	15	146
Quaking aspen	10,066	2,315	7,751	996	135	861
Paper birch	5,875	2,599	3,276	493	109	384
Black cherry	252	61	191	15	--	15
Other hardwoods	12	12	--	--	--	--
Total	45,358	11,659	33,699	3,645	741	2,904
All species	89,821	28,713	61,108	5,574	1,246	4,328

(Table 7 continued on next page)

(Table 7 continued)

Species group	Tree class: Growing stock: Total	Growing stock: Pole-timber	Growing stock: Saw-timber	Cull: Total	Cull: Shortlog	Cull: Other 2/
WESTERN UPPER PENINSULA						
SOFTWOODS						
Jack pine	2,197	682	1,515	65	23	42
Red pine	2,011	62	1,949	13	--	13
White pine	5,474	156	5,318	42	17	25
White spruce	6,134	1,076	5,058	44	12	32
Black spruce	1,691	1,005	686	--	--	--
Balsam fir	9,312	5,033	4,279	97	16	81
Hemlock	7,582	467	7,115	310	112	198
Tamarack	454	128	326	32	--	32
Northern white-cedar	9,968	2,004	7,964	1,255	379	876
Total	44,823	10,613	34,210	1,858	559	1,299
HARDWOODS						
White oak	95	--	95	37	--	37
Select red oak	2,093	321	1,772	92	40	52
Basswood	1,268	200	1,068	60	--	60
Beech	25	25	--	11	11	--
Yellow birch	6,143	856	5,287	980	237	743
Hard maple	23,529	5,757	17,772	1,618	415	1,203
Soft maple	9,901	3,740	6,161	907	193	714
Elm	1,677	286	1,391	75	12	63
Ash	2,389	832	1,557	115	9	106
Cottonwood	18	--	18	--	--	--
Balsam poplar	1,435	92	1,343	21	9	12
Bigtooth aspen	2,676	687	1,989	172	11	161
Quaking aspen	15,121	2,637	12,484	1,674	272	1402
Paper birch	6,672	2,279	4,393	379	96	283
Black cherry	837	396	441	39	8	31
Total	73,879	18,108	55,771	6,180	1,313	4,867
All species	118,702	28,721	89,981	8,038	1,872	6,166
NORTHERN LOWER PENINSULA						
SOFTWOODS						
Jack pine	8,457	3,798	4,659	137	26	111
Red pine	9,797	1,858	7,939	19	10	9
White pine	7,489	598	6,891	57	39	18
White spruce	1,670	438	1,232	12	5	7
Black spruce	448	317	131	7	--	7
Balsam fir	3,442	2,176	1,266	42	14	28
Hemlock	2,699	577	2,122	92	22	70
Tamarack	334	152	182	21	--	21
Northern white-cedar	11,369	5,489	5,880	1,231	229	1,002
Other softwoods	904	627	277	99	--	99
Total	46,609	16,030	30,579	1,717	345	1,372
HARDWOODS						
White oak	5,543	1,286	4,257	309	92	217
Select red oak	17,888	1,815	16,073	758	281	477
Other red oak	2,596	196	2,400	154	42	112
Hickory	37	18	19	--	--	--
Basswood	4,765	606	4,159	121	16	105
Beech	3,185	428	2,757	610	140	470
Yellow birch	999	208	791	80	55	25
Hard maple	13,602	3,205	10,397	565	197	368
Soft maple	16,605	5,701	10,904	677	152	525
Elm	281	69	212	--	--	--
Ash	5,367	2,050	3,317	105	--	105
Cottonwood	384	--	384	--	--	--
Balsam poplar	4,294	347	3,947	228	11	217
Bigtooth aspen	23,189	4,187	19,002	818	78	740
Quaking aspen	20,737	3,628	17,109	1,389	197	1,192
Paper birch	7,198	3,170	4,028	368	38	330
Black cherry	1,469	393	1,076	52	15	37
Other hardwoods	491	70	421	74	--	74
Total	128,630	27,377	101,253	6,308	1,314	4,994
All species	175,239	43,407	131,832	8,025	1,659	6,366

(Table 7 continued on next page)

(Table 7 continued)

SOUTHERN LOWER PENINSULA

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2]
SOFTWOODS						
Jack pine	346	59	287	--	--	--
Red pine	811	261	550	13	13	--
White pine	2,426	329	2,097	--	--	--
Hemlock	383	19	364	--	--	--
Tamarack	87	6	81	--	--	--
Northern white-cedar	184	159	25	27	--	27
Other softwoods	609	43	566	--	--	--
Total	4,846	876	3,970	40	13	27
HARDWOODS						
White oak	6,123	564	5,559	67	--	67
Select red oak	8,504	623	7,881	175	22	153
Other red oak	1,503	--	1,503	38	22	16
Hickory	1,767	247	1,520	--	--	--
Basswood	2,530	722	1,808	112	8	104
Beech	1,083	28	1,055	156	45	111
Yellow birch	191	--	191	17	11	6
Hard maple	3,265	201	3,064	126	--	126
Soft maple	9,854	1,745	8,109	356	51	305
Elm	969	677	292	--	--	--
Ash	3,989	650	3,339	122	22	100
Cottonwood	1,988	19	1,969	15	--	15
Balsam poplar	341	133	208	--	--	--
Bigtooth aspen	2,489	403	2,086	42	--	42
Quaking aspen	1,715	758	957	12	--	12
Paper birch	233	55	178	--	--	--
Black cherry	1,231	390	841	238	125	113
Other hardwoods	1,488	250	1,238	230	4	226
Total	49,263	7,465	41,798	1,706	310	1,396
All species	54,109	8,341	45,768	1,746	323	1,423

[1] Tables may not add to totals due to rounding.
[2] Rough and rotten cull.

Table 8.--Average annual yields of growing stock from harvest by species group, forest type, and Forest Survey Unit, Michigan, 1981-1990[1/]

(In thousand cubic feet)

ALL UNITS

Species group	All types	Forest type													
		Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	15,300	13,074	968	--	7	219	20	--	--	585	--	14	281	46	86
Red pine	16,116	1,300	11,398	306	67	140	189	--	11	273	--	281	1,503	202	446
White pine	20,208	377	2,544	4,059	259	595	1,560	--	1,159	1,650	1,177	3,136	3,069	373	250
White spruce	10,721	15	222	246	930	244	2,307	--	1,163	50	425	1,389	3,435	295	--
Black spruce	5,503	113	163	39	104	2,797	407	109	844	--	125	212	481	109	--
Balsam fir	19,119	17	89	77	373	681	5,826	45	1,110	20	782	2,112	7,324	663	--
Hemlock	14,573	--	143	7	9	92	378	--	570	--	629	12,071	570	104	--
Tamarack	1,458	--	--	--	--	82	69	775	174	--	50	118	165	25	--
Northern white-cedar	36,230	--	55	66	527	2,237	2,419	142	16,276	44	2,083	4,104	7,205	1,060	12
Other softwoods	1,513	--	104	--	--	--	--	--	--	22	--	--	--	--	1,387
Total	140,741	14,896	15,686	4,800	2,276	7,087	13,175	1,071	21,307	2,644	5,271	23,437	24,033	2,877	2,181
HARDWOODS															
White oak	11,761	160	141	--	--	--	--	--	--	9,227	338	1,128	749	18	--
Select red oak	28,859	1,307	971	123	--	--	--	--	--	16,516	139	3,745	5,830	226	2
Other red oak	4,099	452	111	--	--	--	--	--	--	3,215	143	66	74	--	38
Hickory	1,804	--	--	--	--	--	--	--	--	925	121	758	--	--	--
Basswood	8,787	--	44	--	--	--	--	--	--	155	991	6,078	1,384	135	--
Beech	8,459	--	--	24	--	--	--	--	--	91	23	8,207	114	--	--
Yellow birch	10,154	--	--	45	--	114	524	--	337	18	699	7,967	323	127	--
Hard maple	46,786	--	39	107	4	25	155	--	334	284	375	41,416	3,535	512	--
Soft maple	45,197	269	311	298	116	248	1,656	--	777	2,159	10,533	16,591	10,960	1,279	--
Elm	3,329	--	--	--	12	--	45	--	1	75	631	1,917	625	9	14
Ash	12,650	--	--	--	--	116	246	--	323	682	4,577	5,040	1,543	123	--
Cottonwood	2,390	--	--	--	--	--	--	--	--	180	941	501	768	--	--
Balsam poplar	8,946	--	9	--	20	27	328	--	249	--	383	315	7,514	101	--
Bigtooth aspen	30,512	46	430	47	--	--	3	--	132	1,245	120	1,388	26,592	470	39
Quaking aspen	47,639	242	337	252	117	328	1,373	9	416	215	705	2,247	40,513	814	71
Paper birch	19,978	75	217	156	116	301	1,040	--	1,051	295	386	1,910	9,348	5,083	--
Black cherry	3,789	30	171	--	--	--	138	--	15	748	292	1,279	1,082	10	24
Other hardwoods	1,991	--	23	--	--	--	--	--	22	396	487	920	123	20	--
Total	297,130	2,581	2,804	1,052	385	1,159	5,508	9	3,657	36,426	21,884	101,473	111,077	8,927	188
All species	437,871	17,477	18,490	5,852	2,661	8,246	18,683	1,080	24,964	39,070	27,155	124,910	135,110	11,804	2,369

(Table 8 continued on next page)

(Table 8 continued)

WESTERN UPPER PENINSULA

Species group	All types	Forest type: Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	2,197	1,994	11	--	--	60	20	--	--	--	--	--	66	46	--
Red pine	2,011	47	1,172	181	15	85	189	--	--	6	--	31	285	--	--
White pine	5,474	29	425	764	183	198	1,031	--	126	--	23	1,430	1,048	217	--
White spruce	6,134	15	71	196	457	201	1,912	--	166	18	262	1,248	1,409	179	--
Black spruce	1,691	36	28	--	95	583	353	39	138	--	24	132	174	89	--
Balsam fir	9,312	--	51	10	159	524	3,503	21	302	20	253	1,496	2,576	397	--
Hemlock	7,582	--	--	--	--	48	155	--	10	--	233	7,041	95	--	--
Tamarack	454	--	--	--	--	9	59	210	2	--	50	--	99	25	--
Northern white-cedar	9,968	--	--	--	172	1,757	1,371	10	3,338	--	649	2,032	274	365	--
Total	44,823	2,121	1,758	1,151	1,081	3,465	8,593	280	4,082	44	1,494	13,410	6,026	1,318	--
HARDWOODS															
White oak	95	--	--	--	--	--	--	--	--	--	--	--	95	--	--
Select red oak	2,093	61	76	--	--	--	--	--	--	268	--	721	799	168	--
Basswood	1,268	--	--	--	--	--	--	--	--	--	53	997	218	--	--
Beech	25	--	--	--	--	--	--	--	--	--	--	25	--	--	--
Yellow birch	6,143	--	--	3	--	114	388	--	74	18	357	5,044	125	20	--
Hard maple	23,529	--	--	107	4	25	145	--	151	83	109	20,794	1,810	301	--
Soft maple	9,901	10	36	106	19	126	949	--	146	8	704	5,346	1,955	496	--
Elm	1,677	--	--	--	12	--	45	--	--	--	135	1,175	310	--	--
Ash	2,389	--	--	--	--	116	129	--	34	--	1,424	473	202	11	--
Cottonwood	18	--	--	--	--	--	--	--	--	--	--	--	18	--	--
Balsam poplar	1,435	--	9	--	--	--	113	--	--	--	--	86	1,207	20	--
Bigtooth aspen	2,676	14	118	--	--	--	3	--	--	--	--	176	2,137	228	--
Quaking aspen	15,121	12	36	195	51	169	688	--	10	7	13	1,266	12,235	439	--
Paper birch	6,672	26	60	8	86	59	481	--	215	--	71	1,016	2,277	2,373	--
Black cherry	837	--	--	--	--	--	138	--	--	--	--	344	345	10	--
Total	73,879	123	335	419	172	609	3,079	--	630	384	2,866	37,463	23,733	4,066	--
All species	118,702	2,244	2,093	1,570	1,253	4,074	11,672	280	4,712	428	4,360	50,873	29,759	5,384	--

(Table 8 continued on next page)

(Table 8 continued)

NORTHERN LOWER PENINSULA

Species group	All types	Forest type													
		Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	8,457	6,939	735	--	--	--	--	--	--	585	--	14	136	--	48
Red pine	9,797	669	7,123	17	--	--	--	--	--	267	--	250	1,009	117	345
White pine	7,489	169	1,372	1,420	--	--	159	--	263	851	862	838	1,411	120	24
White spruce	1,670	--	127	--	127	--	74	--	614	--	27	--	680	21	--
Black spruce	448	--	60	16	--	150	--	34	41	--	29	--	118	--	--
Balsam fir	3,442	17	38	--	105	--	523	--	228	--	277	15	2,086	53	--
Hemlock	2,699	--	143	--	--	--	--	--	284	--	96	1,829	297	50	--
Tamarack	334	--	--	--	--	--	--	129	108	--	--	41	56	--	--
Northern white-cedar	11,369	--	55	63	174	259	77	--	4,678	44	1,055	846	4,053	53	12
Other softwoods	904	--	104	--	--	--	--	--	--	--	--	--	--	--	800
Total	46,609	7,794	9,757	1,516	406	409	933	163	6,216	1,747	2,346	3,833	9,846	414	1,229
HARDWOODS															
White oak	5,543	160	141	--	--	--	--	--	--	4,408	30	210	576	18	--
Select red oak	17,888	1,238	895	93	--	--	--	--	--	10,024	11	1,223	4,346	58	--
Other red oak	2,596	452	111	--	--	--	--	--	--	1,920	--	39	74	--	--
Hickory	37	--	--	--	--	--	--	--	--	--	--	37	--	--	--
Basswood	4,765	--	44	--	--	--	--	--	--	40	253	3,264	1,101	63	--
Beech	3,185	--	--	--	--	--	--	--	--	91	--	2,992	102	--	--
Yellow birch	999	--	--	42	--	--	--	--	55	--	122	610	119	51	--
Hard maple	13,602	--	39	--	--	--	--	--	--	127	46	12,313	947	130	--
Soft maple	16,605	172	275	68	--	--	187	--	184	1,371	2,882	3,174	7,720	572	--
Elm	281	--	--	--	--	--	--	--	--	--	--	232	35	--	14
Ash	5,367	--	--	--	--	--	45	--	139	159	1,458	2,552	967	47	--
Cottonwood	384	--	--	--	--	--	--	--	--	--	266	--	118	--	--
Balsam poplar	4,294	--	--	--	1	--	35	--	177	--	352	129	3,600	--	--
Bigtooth aspen	23,189	32	243	38	--	--	--	--	132	959	120	1,013	20,480	133	39
Quaking aspen	20,737	210	249	17	--	--	91	9	155	196	282	860	18,345	255	68
Paper birch	7,198	36	55	22	--	--	71	--	269	288	111	630	4,613	1,103	--
Black cherry	1,469	18	69	--	--	--	--	--	15	102	35	594	614	--	22
Other hardwoods	491	--	23	--	--	--	--	--	14	114	233	--	87	20	--
Total	128,630	2,318	2,144	280	1	--	429	9	1,140	19,799	6,201	29,872	63,844	2,450	143
All species	175,239	10,112	11,901	1,796	407	409	1,362	172	7,356	21,546	8,547	33,705	73,690	2,864	1,372

(Table 8 continued on next page)

(Table 8 continued)

EASTERN UPPER PENINSULA

Species group	All types	Forest type: Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	4,300	3,833	222	--	7	159	--	--	--	--	--	--	79	--	--
Red pine	3,497	584	2,393	108	52	55	--	--	11	--	--	--	209	85	--
White pine	4,819	179	747	1,040	76	397	370	--	770	23	156	651	374	36	--
White spruce	2,917	--	24	50	346	43	321	--	383	32	136	141	1,346	95	--
Black spruce	3,364	77	75	23	9	2,064	54	36	665	--	72	80	189	20	--
Balsam fir	6,365	--	--	67	109	157	1,700	24	580	--	252	601	2,662	213	--
Hemlock	3,909	--	--	7	9	44	223	--	276	--	300	2,818	178	54	--
Tamarack	583	--	--	--	--	73	10	436	54	--	--	--	10	--	--
Northern white-cedar	14,709	--	--	3	181	221	971	132	8,211	--	379	1,091	2,878	642	--
Total	44,463	4,673	3,461	1,298	789	3,213	3,649	628	10,950	55	1,295	5,382	7,925	1,145	--
HARDWOODS															
Select red oak	374	8	--	--	--	--	--	--	--	231	4	29	102	--	--
Basswood	224	--	--	--	--	--	--	--	--	36	--	123	65	--	--
Beech	4,166	--	--	24	--	--	--	--	--	--	23	4,107	12	--	--
Yellow birch	2,821	--	--	--	--	--	136	--	208	--	220	2,122	79	56	--
Hard maple	6,390	--	--	--	--	--	10	--	183	7	37	5,294	778	81	--
Soft maple	8,837	24	--	124	97	122	520	--	447	48	1,930	4,430	908	187	--
Elm	402	--	--	--	--	--	--	--	--	--	88	157	148	9	--
Ash	905	--	--	--	--	--	72	--	148	--	239	169	212	65	--
Balsam poplar	2,876	--	--	--	19	27	180	--	72	--	6	73	2,418	81	--
Bigtooth aspen	2,158	--	69	9	--	--	--	--	--	--	--	23	1,948	109	--
Quaking aspen	10,066	20	52	40	66	159	594	--	245	12	23	78	8,665	112	--
Paper birch	5,875	13	102	126	30	242	488	--	554	7	55	264	2,428	1,566	--
Black cherry	252	12	59	--	--	--	--	--	--	--	25	134	22	--	--
Other hardwoods	12	--	--	--	--	--	--	--	--	--	--	--	12	--	--
Total	45,358	77	282	323	212	550	2,000	--	1,857	341	2,650	17,003	17,797	2,266	--
All species	89,821	4,750	3,743	1,621	1,001	3,763	5,649	628	12,807	396	3,945	22,385	25,722	3,411	--

(Table 8 continued on next page)

(Table 8 continued)

SOUTHERN LOWER PENINSULA

Species group	All types	Forest type													
		Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	346	308	--	--	--	--	--	--	--	--	--	--	--	--	38
Red pine	811	--	710	--	--	--	--	--	--	--	--	--	--	--	101
White pine	2,426	--	--	835	--	--	--	--	--	776	136	217	236	--	226
Hemlock	383	--	--	--	--	--	--	--	--	--	--	383	--	--	--
Tamarack	87	--	--	--	--	--	--	--	10	--	--	77	--	--	--
Northern white-cedar	184	--	--	--	--	--	--	--	49	--	--	135	--	--	--
Other softwoods	609	--	--	--	--	--	--	--	--	22	--	--	--	--	587
Total	4,846	308	710	835	--	--	--	--	59	798	136	812	236	--	952
HARDWOODS															
White oak	6,123	--	--	--	--	--	--	--	--	4,819	308	918	78	--	--
Select red oak	8,504	--	--	30	--	--	--	--	--	5,993	124	1,772	583	--	2
Other red oak	1,503	--	--	--	--	--	--	--	--	1,295	143	27	--	--	38
Hickory	1,767	--	--	--	--	--	--	--	--	925	121	721	--	--	--
Basswood	2,530	--	--	--	--	--	--	--	--	79	685	1,694	--	72	--
Beech	1,083	--	--	--	--	--	--	--	--	--	--	1,083	--	--	--
Yellow-birch	191	--	--	--	--	--	--	--	--	--	--	191	--	--	--
Hard maple	3,265	--	--	--	--	--	--	--	--	67	183	3,015	--	--	--
Soft maple	9,854	63	--	--	--	--	--	--	--	732	5,017	3,641	377	24	--
Elm	969	--	--	--	--	--	--	--	1	75	408	353	132	--	--
Ash	3,989	--	--	--	--	--	--	--	2	523	1,456	1,846	162	--	--
Cottonwood	1,988	--	--	--	--	--	--	--	--	180	675	501	632	--	--
Balsam poplar	341	--	--	--	--	--	--	--	--	--	25	27	289	--	--
Bigtooth aspen	2,489	--	--	--	--	--	--	--	--	286	--	176	2,027	--	--
Quaking aspen	1,715	--	--	--	--	--	--	--	6	--	387	43	1,268	8	3
Paper birch	233	--	--	--	--	--	--	--	13	--	149	--	30	41	--
Black cherry	1,231	--	43	--	--	--	--	--	--	646	232	207	101	--	2
Other hardwoods	1,488	--	--	--	--	--	--	--	8	282	254	920	24	--	--
Total	49,263	63	43	30	--	--	--	--	30	15,902	10,167	17,135	5,703	145	45
All species	54,109	371	753	865	--	--	--	--	89	16,700	10,303	17,947	5,939	145	997

1/ Tables may not add to totals due to rounding.

Table 9.--Average annual yields of growing stock from harvest by forest type, stand age class, and Forest Survey Unit, Michigan, 1981-1990[1/]

(In thousand cubic feet)

ALL UNITS

Forest type	All ages	Stand-age class (years) 1-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	17,477	--	--	--	6,016	4,749	4,463	1,446	505	193	105	--
Red pine	18,490	--	--	4,523	1,034	2,927	2,468	1,715	1,863	3,719	241	--
White pine	5,852	--	--	--	--	--	865	--	522	573	2,756	1,136
White spruce	2,661	--	--	--	--	--	--	683	--	1,572	--	406
Black spruce	8,246	--	--	--	556	1,221	1,504	375	903	1,877	1,119	691
Balsam fir	18,683	--	--	--	1,590	1,410	3,491	3,183	2,740	3,915	1,707	647
Tamarack	1,080	--	--	--	--	94	177	167	235	215	--	192
Northern white-cedar	24,964	--	--	--	--	--	46	--	--	4,191	10,671	10,056
Oak-hickory	39,070	--	--	--	--	--	--	--	7,704	23,261	7,213	892
Elm-ash-maple	27,155	--	--	--	--	--	--	--	3,623	14,499	6,260	2,773
Maple-birch	124,910	--	--	--	--	--	--	--	16,589	40,267	51,744	16,310
Aspen	135,110	--	--	470	28,930	41,253	28,512	14,876	10,123	9,539	1,407	--
Paper birch	11,804	--	145	--	--	2,459	3,924	1,478	2,022	615	877	284
Exotic	2,369	--	931	260	1,178	--	--	--	--	--	--	--
All types	437,871	--	1,076	5,253	39,304	54,113	45,450	23,923	46,829	104,436	84,100	33,387

EASTERN UPPER PENINSULA

Jack pine	4,750	--	--	--	2,141	1,544	609	456	--	--	--	--
Red pine	3,743	--	--	245	414	669	1,066	117	308	924	--	--
White pine	1,621	--	--	--	--	--	--	--	--	60	814	747
White spruce	1,001	--	--	--	--	--	--	682	--	319	--	--
Black spruce	3,763	--	--	--	556	1,221	840	375	486	152	--	133
Balsam fir	5,649	--	--	--	1,590	1,410	773	222	412	944	298	--
Tamarack	628	--	--	--	--	--	177	167	178	106	--	--
Northern white-cedar	12,807	--	--	--	--	--	--	--	--	2,272	5,796	4,739
Oak-hickory	396	--	--	--	--	--	--	--	154	--	242	--
Elm-ash-maple	3,945	--	--	--	--	--	--	--	--	2,499	1,085	361
Maple-birch	22,385	--	--	--	--	--	--	--	--	5,599	12,023	4,763
Aspen	25,722	--	--	--	8,722	7,949	2,207	1,863	3,595	1,386	--	--
Paper birch	3,411	--	--	--	--	1,301	1,021	--	474	615	--	--
All types	89,821	--	--	245	13,423	14,094	6,693	3,882	5,607	14,876	20,258	10,743

(Table 9 continued on next page)

(Table 9 continued)

Forest type	All ages	Stand-age class (years) 1-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
WESTERN UPPER PENINSULA												
Jack pine	2,244	--	--	--	635	656	510	268	175	--	--	--
Red pine	2,093	--	--	--	--	--	--	--	144	1,708	241	--
White pine	1,570	--	--	--	--	--	--	--	--	195	986	389
White spruce	1,253	--	--	--	--	--	--	--	--	1,253	--	--
Black spruce	4,074	--	--	--	--	--	255	--	417	1,725	1,119	558
Balsam fir	11,672	--	--	--	--	--	2,718	2,940	2,328	2,688	351	647
Tamarack	280	--	--	--	--	31	--	--	57	--	--	192
Northern white-cedar	4,712	--	--	--	--	--	--	--	--	--	2,166	2,546
Oak-hickory	428	--	--	--	--	--	--	--	--	87	341	--
Elm-ash-maple	4,360	--	--	--	--	--	--	--	--	--	1,948	2,412
Maple-birch	50,873	--	--	--	--	--	--	--	--	7,317	32,009	11,547
Aspen	29,759	--	--	--	6,052	7,654	9,559	4,097	720	1,677	--	--
Paper birch	5,384	--	--	--	--	--	1,615	1,472	1,136	--	877	284
All types	118,702	--	--	--	6,687	8,341	14,657	8,777	4,977	16,650	40,038	18,575
NORTHERN LOWER PENINSULA												
Jack pine	10,112	--	--	--	3,240	2,178	3,344	722	330	193	105	--
Red pine	11,901	--	--	3,525	620	2,258	1,402	1,598	1,411	1,087	--	--
White pine	1,796	--	--	--	--	--	--	--	522	318	956	--
White spruce	407	--	--	--	--	--	--	1	--	--	--	406
Black spruce	409	--	--	--	--	--	409	--	--	--	--	--
Balsam fir	1,362	--	--	--	--	--	--	21	--	283	1,058	--
Tamarack	172	--	--	--	--	63	--	--	--	109	--	--
Northern white-cedar	7,356	--	--	--	--	--	--	--	--	1,876	2,709	2,771
Oak-hickory	21,546	--	--	--	--	--	--	--	7,550	11,016	2,739	241
Elm-ash-maple	8,547	--	--	--	--	--	--	--	1,179	4,997	2,371	--
Maple-birch	33,705	--	--	--	--	--	--	--	14,045	15,724	3,936	--
Aspen	73,690	--	--	--	12,565	22,247	16,271	8,916	5,808	6,476	1,407	--
Paper birch	2,864	--	--	--	--	1,158	1,288	6	412	--	--	--
Exotic	1,372	--	909	260	203	--	--	--	--	--	--	--
All types	175,239	--	909	3,785	16,628	27,904	22,714	11,264	31,257	42,079	15,281	3,418
SOUTHERN LOWER PENINSULA												
Jack pine	371	--	--	--	--	371	--	--	--	--	--	--
Red pine	753	--	--	753	--	--	--	--	--	--	--	--
White pine	865	--	--	--	--	--	865	--	--	--	--	--
Northern white-cedar	89	--	--	--	--	--	46	--	--	43	--	--
Oak-hickory	16,700	--	--	--	--	--	--	--	--	12,158	3,891	651
Elm-ash-maple	10,303	--	--	--	--	--	--	--	2,444	7,003	856	--
Maple-birch	17,947	--	--	--	--	--	--	--	2,544	11,627	3,776	--
Aspen	5,939	--	--	470	1,591	3,403	475	--	--	--	--	--
Paper birch	145	--	145	--	--	--	--	--	--	--	--	--
Exotic	997	--	22	--	975	--	--	--	--	--	--	--
All types	54,109	--	167	1,223	2,566	3,774	1,386	--	4,988	30,831	8,523	651

1/ Tables may not add to totals due to rounding.

Table 10.--Commercial forest area qualifying for thinning by forest type, stand-age class, and Forest Survey Unit, Michigan, 1981-1990[1/]

(In thousand acres)

Forest type	All ages	Stand-age class (years) 1-20	21-30	31-40	41-50	51-60	61-70	71-80	81+
ALL UNITS									
Red pine	139.0	--	76.8	49.4	12.9	--	--	--	--
White pine	3.3	--	--	--	3.3	--	--	--	--
White spruce	9.1	--	--	--	9.1	--	--	--	--
Oak-hickory	191.5	--	11.5	73.6	106.4	--	--	--	--
Maple-birch	1,975.3	--	65.0	181.2	604.2	575.0	327.1	222.8	--
All types	2,318.4	--	153.3	304.2	735.9	575.0	327.1	222.8	--
EASTERN UPPER PENINSULA									
Red pine	14.3	--	9.6	3.0	1.7	--	--	--	--
White spruce	7.4	--	--	--	7.4	--	--	--	--
Oak-hickory	1.9	--	--	0.4	1.5	--	--	--	--
Maple-birch	419.0	--	19.7	39.6	132.7	101.8	84.2	41.0	--
All types	442.6	--	29.4	42.9	143.3	101.8	84.2	41.0	--
WESTERN UPPER PENINSULA									
Red pine	13.7	--	7.7	6.0	--	--	--	--	--
White spruce	1.7	--	--	--	1.7	--	--	--	--
Oak-hickory	6.6	--	1.6	1.7	3.3	--	--	--	--
Maple-birch	827.3	--	18.1	67.5	268.4	265.5	118.9	89.0	--
All types	849.4	--	27.4	75.2	273.4	265.5	118.9	89.0	--
NORTHERN LOWER PENINSULA									
Red pine	101.8	--	56.9	37.1	7.9	--	--	--	--
Oak-hickory	103.9	--	9.9	38.0	56.0	--	--	--	--
Maple-birch	589.6	--	9.5	45.7	179.1	188.3	98.5	68.5	--
All types	795.4	--	76.3	120.8	243.0	188.3	98.5	68.5	--
SOUTHERN LOWER PENINSULA									
Red pine	9.2	--	2.6	3.3	3.3	--	--	--	--
White pine	3.3	--	--	--	3.3	--	--	--	--
Oak-hickory	79.1	--	--	33.5	45.6	--	--	--	--
Maple-birch	139.3	--	17.7	28.4	24.0	19.5	25.4	24.4	--
All types	231.0	--	20.3	65.2	76.2	19.5	25.4	24.4	--

[1/] Tables may not add to totals due to rounding.

Table 11.--Average annual yields from thinning by species group, tree class, and Forest Survey Unit, Michigan, 1981-1990[1/]

(In thousand cubic feet)

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
ALL UNITS						
SOFTWOODS						
Jack pine	1,593	1,258	335	131	35	96
Red pine	11,000	9,912	1,088	186	--	186
White pine	965	412	553	51	13	38
White spruce	573	446	127	--	--	--
Black spruce	284	235	49	--	--	--
Balsam fir	3,892	3,298	594	35	5	30
Hemlock	2,026	894	1,132	150	--	150
Tamarack	10	10	--	--	--	--
Northern white-cedar	1,167	825	342	230	14	216
Other softwoods	273	251	22	--	--	--
Total	21,783	17,541	4,242	783	67	716
HARDWOODS						
White oak	1,505	981	524	214	15	199
Select red oak	2,582	1,725	857	272	65	207
Other red oak	846	455	391	52	52	--
Hickory	368	156	212	32	--	32
Basswood	7,351	4,270	3,081	422	110	312
Beech	792	474	318	168	50	118
Yellow birch	922	737	185	115	19	96
Hard maple	35,817	22,572	13,245	2,641	353	2,288
Soft maple	29,449	18,813	10,636	2,052	223	1,829
Elm	4,154	2,245	1,909	235	39	196
Ash	5,848	3,291	2,557	178	39	139
Cottonwood	176	27	149	--	--	--
Balsam poplar	142	44	98	1	--	1
Bigtooth aspen	3,107	1,769	1,338	142	--	142
Quaking aspen	4,079	2,120	1,959	252	7	245
Paper birch	3,067	1,722	1,345	186	16	170
Black cherry	4,299	2,381	1,918	390	33	357
Other hardwoods	657	239	418	29	29	--
Total	105,161	64,021	41,140	7,381	1,050	6,331
All species	126,944	81,562	45,382	8,164	1,117	7,047
EASTERN UPPER PENINSULA						
SOFTWOODS						
Jack pine	119	57	62	17	10	7
Red pine	887	771	116	--	--	--
White pine	212	94	118	9	9	--
White spruce	161	146	15	--	--	--
Black spruce	76	41	35	--	--	--
Balsam fir	906	748	158	9	--	9
Hemlock	363	132	231	57	--	57
Northern white-cedar	240	178	62	17	--	17
Total	2,964	2,167	797	109	19	90
HARDWOODS						
Select red oak	105	74	31	--	--	--
Basswood	592	269	323	41	--	41
Beech	144	133	11	43	18	25
Yellow birch	64	29	35	7	--	7
Hard maple	7,772	3,983	3,789	491	210	281
Soft maple	8,731	5,035	3,696	739	46	693
Elm	668	278	390	48	--	48
Ash	323	228	95	13	--	13
Balsam poplar	58	23	35	1	--	1
Bigtooth aspen	138	51	87	32	--	32
Quaking aspen	524	238	286	59	7	52
Paper birch	872	442	430	89	7	82
Black cherry	930	491	439	97	--	97
Total	20,921	11,274	9,647	1,660	288	1,372
All species	23,885	13,441	10,444	1,769	307	1,462

(Table 11 continued on next page)

(Table 11 continued)

WESTERN UPPER PENINSULA

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
SOFTWOODS						
Jack pine	154	127	27	8	--	8
Red pine	683	683	0	29	--	29
White pine	287	77	210	3	--	3
White spruce	412	300	112	--	--	--
Black spruce	208	194	14	--	--	--
Balsam fir	2,825	2,411	414	26	5	21
Hemlock	1,113	353	760	85	--	85
Norther white-cedar	467	296	171	108	--	108
Other softwoods	22	--	22	--	--	--
Total	6,171	4,441	1,730	259	5	254
HARDWOODS						
Select red oak	318	232	86	31	--	31
Basswood	3,146	1,795	1,351	133	73	60
Yellow birch	745	635	110	100	19	81
Hard maple	14,787	10,209	4,578	1,563	74	1,489
Soft maple	11,920	8,590	3,330	846	85	761
Elm	2,527	1,254	1,273	84	39	45
Ash	1,674	1,272	402	71	8	63
Balsam poplar	70	7	63	--	--	--
Bigtooth aspen	422	247	175	37	--	37
Quaking aspen	2,258	1,067	1,191	108	--	108
Paper birch	854	472	382	43	9	34
Black cherry	1,112	751	361	88	--	88
Total	39,833	26,531	13,302	3,104	307	2,797
All species	46,004	30,972	15,032	3,363	312	3,051

NORTHERN LOWER PENINSULA

SOFTWOODS						
Jack pine	1,300	1,074	226	106	25	81
Red pine	8,743	7,982	761	130	--	130
White pine	244	130	114	39	4	35
Balsam fir	139	139	--	--	--	--
Hemlock	534	393	141	8	--	8
Tamarack	10	10	--	--	--	--
Northern white-cedar	460	351	109	105	14	91
Other softwoods	166	166	--	--	--	--
Total	11,596	10,245	1,351	388	43	345
HARDWOODS						
White oak	919	564	355	80	15	65
Select red oak	1,522	982	540	222	65	157
Other red oak	642	281	361	--	--	--
Hickory	41	17	24	--	--	--
Basswood	3,581	2,174	1,407	248	37	211
Beech	648	341	307	125	32	93
Yellow birch	113	73	40	8	--	8
Hard maple	12,498	8,295	4,203	528	49	479
Soft maple	7,505	4,676	2,829	222	60	162
Elm	520	361	159	16	--	16
Ash	2,938	1,189	1,749	69	31	38
Balsam poplar	14	14	--	--	--	--
Bigtooth aspen	2,195	1,190	1,005	73	--	73
Quaking aspen	1,017	637	380	85	--	85
Paper birch	1,305	808	497	54	--	54
Black cherry	1,370	666	704	152	33	119
Total	36,828	22,268	14,560	1,882	322	1,560
All species	48,424	32,513	15,911	2,270	365	1,905

(Table 11 continued on next page)

(Table 11 continued)

SOUTHERN LOWER PENINSULA

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2]
SOFTWOODS						
Jack pine	20	--	20	--	--	--
Red pine	687	476	211	27	--	27
White pine	222	111	111	--	--	--
Balsam fir	22	--	22	--	--	--
Hemlock	16	16	--	--	--	--
Other softwoods	85	85	--	--	--	--
Total	1,052	688	364	27	--	27
HARDWOODS						
White oak	586	417	169	134	--	134
Select red oak	637	437	200	19	--	19
Other red oak	204	174	30	52	52	--
Hickory	327	139	188	32	--	32
Basswood	32	32	--	--	--	--
Hard maple	760	85	675	59	20	39
Soft maple	1,293	512	781	245	32	213
Elm	439	352	87	87	--	87
Ash	913	602	311	25	--	25
Cottonwood	176	27	149	--	--	--
Bigtooth aspen	352	281	71	--	--	--
Quaking aspen	280	178	102	--	--	--
Paper birch	36	--	36	--	--	--
Black cherry	887	473	414	53	--	53
Other hardwoods	657	239	418	29	29	--
Total	7,579	3,948	3,631	735	133	602
All species	8,631	4,636	3,995	762	133	629

[1] Tables may not add to totals due to rounding.
[2] Rough and rotten cull.

Table 12.--Average annual yields of growing stock from thinning by species group, forest type, and Forest Survey Unit, Michigan, 1981-1990[1/]

(In thousand cubic feet)

ALL UNITS

Species group	All types	Forest type[2/] Red pine	White pine	White spruce	Balsam fir	Oak-hickory	Maple-birch
SOFTWOODS							
Jack pine	1,593	1,415	--	13	--	165	--
Red pine	11,000	10,021	73	28	--	471	407
White pine	965	159	66	107	--	74	559
White spruce	573	--	--	--	--	--	573
Black spruce	284	--	--	14	--	--	270
Balsam fir	3,892	125	--	43	--	--	3,724
Hemlock	2,026	--	--	8	--	--	2,018
Tamarack	10	--	--	--	--	--	10
Northern white-cedar	1,167	--	--	35	--	--	1,132
Other softwoods	273	63	--	--	--	--	210
Total	21,783	11,783	139	248	--	710	8,903
HARDWOODS							
White oak	1,505	522	--	--	--	725	258
Select red oak	2,582	156	--	--	--	1,095	1,331
Other red oak	846	380	--	--	--	445	21
Hickory	368	--	--	--	--	46	322
Basswood	7,351	--	--	--	--	--	7,351
Beech	792	54	--	11	--	--	727
Yellow birch	922	--	--	--	--	--	922
Hard maple	35,817	19	--	--	--	--	35,798
Soft maple	29,449	427	--	12	--	839	28,171
Elm	4,154	--	--	13	--	103	4,038
Ash	5,848	7	--	--	--	96	5,745
Cottonwood	176	--	--	--	--	87	89
Balsam poplar	142	--	--	24	--	--	118
Bigtooth aspen	3,107	131	--	--	--	1,291	1,685
Quaking aspen	4,079	171	--	180	--	297	3,431
Paper birch	3,067	25	--	125	--	259	2,658
Black cherry	4,299	97	87	--	--	305	3,810
Other hardwoods	657	--	--	--	--	329	328
Total	105,161	1,989	87	365	--	5,917	96,803
All species	126,944	13,772	226	613	--	6,627	105,706

EASTERN UPPER PENINSULA

SOFTWOODS							
Jack pine	119	116	--	--	--	3	--
Red pine	887	856	--	28	--	3	--
White pine	212	--	--	107	--	--	105
White spruce	161	--	--	--	--	--	161
Black spruce	76	--	--	--	--	--	76
Balsam fir	906	58	--	30	--	--	818
Hemlock	363	--	--	8	--	--	355
Northern white-cedar	240	--	--	35	--	--	205
Total	2,964	1,030	--	208	--	6	1,720
HARDWOODS							
Select red oak	105	--	--	--	--	28	77
Basswood	592	--	--	--	--	--	592
Beech	144	--	--	11	--	--	133
Yellow birch	64	--	--	--	--	--	64
Hard maple	7,772	--	--	--	--	--	7,772
Soft maple	8,731	28	--	12	--	--	8,691
Elm	668	--	--	13	--	--	655
Ash	323	--	--	--	--	--	323
Balsam poplar	58	--	--	24	--	--	34
Bigtooth aspen	138	--	--	--	--	--	138
Quaking aspen	524	--	--	122	--	--	402
Paper birch	872	--	--	82	--	--	790
Black cherry	930	28	--	--	--	--	902
Total	20,921	56	--	264	--	28	20,573
All species	23,885	1,086	--	472	--	34	22,293

(Table 12 continued on next page)

(Table 12 continued)

Species group	All types	Forest type[2/]					
		Red pine	White pine	White spruce	Balsam fir	Oak-hickory	Maple-birch
WESTERN UPPER PENINSULA							
SOFTWOODS							
Jack pine	154	141	--	13	--	--	--
Red pine	683	651	--	--	--	28	4
White pine	287	--	--	--	--	11	276
White spruce	412	--	--	--	--	--	412
Black spruce	208	--	--	14	--	--	194
Balsam fir	2,825	45	--	13	--	--	2,767
Hemlock	1,113	--	--	--	--	--	1,113
Northern white-cedar	467	--	--	--	--	--	467
Other softwoods	22	22	--	--	--	--	--
Total	6,171	859	--	40	--	39	5,233
HARDWOODS							
Select red oak	318	22	--	--	--	20	276
Basswood	3,146	--	--	--	--	--	3,146
Yellow birch	745	--	--	--	--	--	745
Hard maple	14,787	19	--	--	--	--	14,768
Soft maple	11,920	--	--	--	--	104	11,816
Elm	2,527	--	--	--	--	--	2,527
Ash	1,674	--	--	--	--	--	1,674
Balsam poplar	70	--	--	--	--	--	70
Bigtooth aspen	422	47	--	--	--	151	224
Quaking aspen	2,258	171	--	58	--	14	2,015
Paper birch	854	25	--	43	--	112	674
Black cherry	1,112	--	--	--	--	--	1,112
Total	39,833	284	--	101	--	401	39,047
All species	46,004	1,143	--	141	--	440	44,280
NORTHERN LOWER PENINSULA							
SOFTWOODS							
Jack pine	1,300	1,138	--	--	--	162	--
Red pine	8,743	7,900	--	--	--	440	403
White pine	244	66	--	--	--	--	178
Balsam fir	139	--	--	--	--	--	139
Hemlock	534	--	--	--	--	--	534
Tamarack	10	--	--	--	--	--	10
Northern white-cedar	460	--	--	--	--	--	460
Other softwoods	166	41	--	--	--	--	125
Total	11,596	9,145	--	--	--	602	1,849
HARDWOODS							
White oak	919	522	--	--	--	352	45
Select red oak	1,522	90	--	--	--	758	674
Other red oak	642	380	--	--	--	241	21
Hickory	41	--	--	--	--	--	41
Basswood	3,581	--	--	--	--	--	3,581
Beech	648	54	--	--	--	--	594
Yellow birch	113	--	--	--	--	--	113
Hard maple	12,498	--	--	--	--	--	12,498
Soft maple	7,505	399	--	--	--	601	6,505
Elm	520	--	--	--	--	--	520
Ash	2,938	7	--	--	--	28	2,903
Balsam poplar	14	--	--	--	--	--	14
Bigtooth aspen	2,195	67	--	--	--	842	1,286
Quaking aspen	1,017	--	--	--	--	125	892
Paper birch	1,305	--	--	--	--	111	1,194
Black cherry	1,370	69	--	--	--	42	1,259
Total	36,828	1,588	--	--	--	3,100	32,140
All species	48,424	10,733	--	--	--	3,702	33,989

(Table 12 continued on next page)

(Table 12 continued)

SOUTHERN LOWER PENINSULA

Species group	All types	Forest type[2/]					
		Red pine	White pine	White spruce	Balsam fir	Oak-hickory	Maple-birch
SOFTWOODS							
Jack pine	20	20	--	--	--	--	--
Red pine	687	614	73	--	--	--	--
White pine	222	93	66	--	--	63	--
Balsam fir	22	22	--	--	--	--	--
Hemlock	16	--	--	--	--	--	16
Other softwoods	85	--	--	--	--	--	85
Total	1,052	749	139	--	--	63	101
HARDWOODS							
White oak	586	--	--	--	--	373	213
Select red oak	637	44	--	--	--	289	304
Other red oak	204	--	--	--	--	204	--
Hickory	327	--	--	--	--	46	281
Basswood	32	--	--	--	--	--	32
Hard maple	760	--	--	--	--	--	760
Soft maple	1,293	--	--	--	--	134	1,159
Elm	439	--	--	--	--	103	336
Ash	913	--	--	--	--	68	845
Cottonwood	176	--	--	--	--	87	89
Bigtooth aspen	352	17	--	--	--	298	37
Quaking aspen	280	--	--	--	--	158	122
Paper birch	36	--	--	--	--	36	--
Black cherry	887	--	87	--	--	263	537
Other hardwoods	657	--	--	--	--	329	328
Total	7,579	61	87	--	--	2,388	5,043
All species	8,631	810	226	--	--	2,451	5,144

[1/] Tables may not add to totals due to rounding.

[2/] Thinning was a treatment option only in the forest types shown below.

Table 13.--Average annual yields of growing stock from thinning by forest type, stand-age class, and Forest Survey Unit, Michigan, 1981-1990[1/]

(In thousand cubic feet)

Forest type	All ages	Stand-age class (years) 1-20	21-30	31-40	41-50	51-60	61-70	71-80	81+
ALL UNITS									
Red pine	13,772	--	6,370	6,208	1,194	--	--	--	--
White pine	226	--	--	--	226	--	--	--	--
White spruce	613	--	--	--	613	--	--	--	--
Oak-hickory	6,627	--	258	2,548	3,821	--	--	--	--
Maple-birch	105,706	--	2,411	8,405	32,623	30,131	19,446	12,690	--
All types	126,944	--	9,039	17,161	38,477	30,131	19,446	12,690	--
EASTERN UPPER PENINSULA									
Red pine	1,086	--	687	295	104	--	--	--	--
White pine	--	--	--	--	--	--	--	--	--
White spruce	472	--	--	--	472	--	--	--	--
Oak-hickory	34	--	--	8	26	--	--	--	--
Maple-birch	22,293	--	724	1,653	6,635	4,767	6,150	2,364	--
All types	23,885	--	1,411	1,956	7,237	4,767	6,150	2,364	--
WESTERN UPPER PENINSULA									
Red pine	1,143	--	463	680	--	--	--	--	--
White spruce	141	--	--	--	141	--	--	--	--
Oak-hickory	440	--	58	142	240	--	--	--	--
Maple-birch	44,280	--	546	3,303	14,964	14,195	6,517	4,755	--
All types	46,004	--	1,067	4,125	15,345	14,195	6,517	4,755	--
NORTHERN LOWER PENINSULA									
Red pine	10,733	--	5,029	5,009	695	--	--	--	--
Oak-hickory	3,702	--	200	1,227	2,275	--	--	--	--
Maple-birch	33,989	--	620	2,618	10,332	9,990	6,004	4,425	--
All types	48,424	--	5,849	8,854	13,302	9,990	6,004	4,425	--
SOUTHERN LOWER PENINSULA									
Red pine	810	--	191	224	395	--	--	--	--
White pine	226	--	--	--	226	--	--	--	--
Oak-hickory	2,451	--	--	1,171	1,280	--	--	--	--
Maple-birch	5,144	--	521	831	692	1,179	775	1,146	--
All types	8,631	--	712	2,226	2,593	1,179	775	1,146	--

[1/] Tables may not add to totals due to rounding.

Table 14.--Commercial forest area qualifying for timber stand improvement by forest type, stand-age class, and Forest Survey Unit, Michigan, 1981-1990[1/]

(In thousand acres)

Forest type	All ages	Stand-age class (years) 1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81+
ALL UNITS										
Jack pine	59.7	10.5	29.3	19.9	--	--	--	--	--	--
Red pine	1.7	--	--	1.7	--	--	--	--	--	--
White pine	19.7	--	8.4	11.4	--	--	--	--	--	--
White spruce	20.9	--	5.9	--	15.0	--	--	--	--	--
Balsam fir	24.9	--	--	--	24.9	--	--	--	--	--
Northern white-cedar	48.0	--	--	--	--	48.0	--	--	--	--
Oak-hickory	20.1	--	--	4.5	5.4	10.2	--	--	--	--
Maple-birch	732.2	3.3	7.3	83.8	98.2	189.8	182.3	85.3	82.2	--
All types	927.1	13.8	50.8	121.2	143.3	248.0	182.3	85.3	82.2	--
EASTERN UPPER PENINSULA										
Jack pine	5.8	1.7	1.9	2.3	--	--	--	--	--	--
White pine	4.8	--	1.7	3.2	--	--	--	--	--	--
White spruce	3.2	--	3.2	--	--	--	--	--	--	--
Balsam fir	16.5	--	--	--	16.5	--	--	--	--	--
Northern white-cedar	25.8	--	--	--	--	25.8	--	--	--	--
Maple-birch	120.0	--	--	12.6	26.1	30.8	20.3	13.3	16.9	--
All types	176.1	1.7	6.7	18.1	42.5	56.6	20.3	13.3	16.9	--
WESTERN UPPER PENINSULA										
Jack pine	1.7	--	--	1.7	--	--	--	--	--	--
White spruce	12.4	--	--	--	12.4	--	--	--	--	--
Balsam fir	8.4	--	--	--	8.4	--	--	--	--	--
Northern white-cedar	8.8	--	--	--	--	8.8	--	--	--	--
Maple-birch	282.8	--	--	29.1	43.6	66.8	84.2	21.2	38.0	--
All types	314.1	--	--	30.8	64.3	75.6	84.2	21.2	38.0	--
NORTHERN LOWER PENINSULA										
Jack pine	52.2	8.8	27.4	15.9	--	--	--	--	--	--
Red pine	1.7	--	--	1.7	--	--	--	--	--	--
White pine	12.0	--	6.7	5.3	--	--	--	--	--	--
White spruce	2.7	--	2.7	--	--	--	--	--	--	--
Northern white-cedar	13.4	--	--	--	--	13.4	--	--	--	--
Oak-hickory	16.7	--	--	4.5	2.0	10.2	--	--	--	--
Maple-birch	228.7	--	--	23.6	21.9	65.4	70.3	27.3	20.1	--
All types	327.3	8.8	36.8	50.9	23.9	89.0	70.3	27.3	20.1	--
SOUTHERN LOWER PENINSULA										
White pine	2.9	--	--	2.9	--	--	--	--	--	--
White spruce	2.6	--	--	--	2.6	--	--	--	--	--
Oak-hickory	3.4	--	--	--	3.4	--	--	--	--	--
Maple-birch	100.7	3.3	7.3	18.5	6.6	26.8	7.5	23.5	7.2	--
All types	109.6	3.3	7.3	21.4	12.6	26.8	7.5	23.5	7.2	--

[1/] Tables may not add to totals due to rounding.

Table 15.--Average annual yields from timber stand improvement by species group, tree class, and Forest Survey Unit, Michigan, 1981-1990[1/]

(In thousand cubic feet)

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
ALL UNITS						
SOFTWOODS						
Jack pine	201	93	108	7	7	--
Red pine	273	--	273	--	--	--
White pine	351	47	304	27	9	18
White spruce	330	--	330	12	12	--
Balsam fir	705	495	210	6	--	6
Hemlock	31	13	18	8	8	--
Tamarack	9	9	--	--	--	--
Northern white-cedar	52	27	25	--	--	--
Other softwoods	433	372	61	83	--	83
Total	2,385	1,056	1,329	143	36	107
HARDWOODS						
White oak	18	--	18	--	--	--
Select red oak	154	--	154	--	--	--
Other red oak	42	--	42	--	--	--
Basswood	16	--	16	--	--	--
Hard maple	58	13	45	--	--	--
Soft maple	159	146	13	--	--	--
Elm	79	15	64	34	--	34
Ash	142	--	142	--	--	--
Balsam poplar	344	97	247	18	10	8
Bigtooth aspen	165	30	135	--	--	--
Quaking aspen	2,095	819	1,276	98	8	90
Other hardwoods	30	--	30	--	--	--
Total	3,302	1,120	2,182	150	18	132
All species	5,687	2,176	3,511	293	54	239
EASTERN UPPER PENINSULA						
SOFTWOODS						
Red pine	59	--	59	--	--	--
White pine	207	--	207	18	--	18
White spruce	136	--	136	--	--	--
Balsam fir	403	254	149	6	--	6
Hemlock	20	13	7	--	--	--
Northern white-cedar	11	--	11	--	--	--
Total	836	267	569	24	--	24
HARDWOODS						
Soft maple	82	69	13	--	--	--
Balsam poplar	244	60	184	10	10	--
Bigtooth aspen	61	15	46	--	--	--
Quaking aspen	887	274	613	13	8	5
Total	1,274	418	856	23	18	5
All species	2,110	685	1,425	47	18	29

(Table 15 continued on next page)

(Table 15 continued)

Species group	Tree class: Growing stock: Total	Growing stock: Pole-timber	Growing stock: Saw-timber	Cull: Total	Cull: Shortlog	Cull: Other[2/]
WESTERN UPPER PENINSULA						
SOFTWOODS						
White pine	66	47	19	--	--	--
White spruce	164	--	164	--	--	--
Balsam fir	110	90	20	--	--	--
Hemlock	11	--	11	8	8	--
Tamarack	9	9	--	--	--	--
Total	360	146	214	8	8	--
HARDWOODS						
Basswood	16	--	16	--	--	--
Hard maple	28	13	15	--	--	--
Elm	79	15	64	34	--	34
Balsam poplar	86	37	49	--	--	--
Quaking aspen	1,110	476	634	73	--	73
Total	1,319	541	778	107	--	107
All species	1,679	687	992	115	8	107
NORTHERN LOWER PENINSULA						
SOFTWOODS						
Jack pine	201	93	108	7	7	--
Red pine	214	--	214	--	--	--
White pine	78	--	78	9	9	--
Balsam fir	192	151	41	--	--	--
Northern white-cedar	41	27	14	--	--	--
Other softwoods	433	372	61	83	--	83
Total	1,159	643	516	99	16	83
HARDWOODS						
White oak	18	--	18	--	--	--
Select red oak	102	--	102	--	--	--
Other red oak	42	--	42	--	--	--
Soft maple	77	77	--	--	--	--
Balsam poplar	14	--	14	8	--	8
Bigtooth aspen	104	15	89	--	--	--
Quaking aspen	69	69	--	--	--	--
Total	426	161	265	8	--	8
All species	1,585	804	781	107	16	91
SOUTHERN LOWER PENINSULA						
SOFTWOODS						
White spruce	30	--	30	12	12	--
Total	30	--	30	12	12	--
HARDWOODS						
Select red oak	52	--	52	--	--	--
Hard maple	30	--	30	--	--	--
Ash	142	--	142	--	--	--
Quaking aspen	29	--	29	12	--	12
Other hardwoods	30	--	30	--	--	--
Total	283	--	283	12	--	12
All species	313	--	313	24	12	12

[1/] Tables may not add to totals due to rounding.
[2/] Rough and rotten cull.

Table 16.--Average annual yields of growing stock from timber stand improvement by species group, forest type, and Forest Survey Unit, Michigan, 1981-1990[1/]

(In thousand cubic feet)

Species group	All types	Jack pine	Red pine	White pine	White spruce	Balsam fir	Northern white-cedar	Oak-hickory	Maple-birch
				ALL UNITS					
				Forest type[2/]					
SOFTWOODS									
Jack pine	201	201	--	--	--	--	--	--	--
Red pine	273	221	--	52	--	--	--	--	--
White pine	351	75	--	210	66	--	--	--	--
White spruce	330	--	--	--	188	142	--	--	--
Balsam fir	705	--	--	25	10	44	626	--	--
Hemlock	31	--	--	--	--	--	--	--	31
Tamarack	9	--	--	--	9	--	--	--	--
Northern white-cedar	52	--	--	52	--	--	--	--	--
Other softwoods	433	--	--	433	--	--	--	--	--
Total	2,385	497	--	772	273	186	626	--	31
HARDWOODS									
White oak	18	--	--	18	--	--	--	--	--
Select red oak	154	102	--	52	--	--	--	--	--
Other red oak	42	42	--	--	--	--	--	--	--
Basswood	16	--	--	--	--	--	--	--	16
Hard maple	58	--	--	--	--	--	--	--	58
Soft maple	159	--	--	159	--	--	--	--	--
Elm	79	--	--	--	--	49	--	--	30
Ash	142	--	--	--	--	--	--	--	142
Balsam poplar	344	--	--	10	--	59	275	--	--
Bigtooth aspen	165	--	--	--	--	--	165	--	--
Quaking aspen	2,095	--	--	193	1,011	779	68	--	44
Other hardwoods	30	--	--	--	--	--	--	--	30
Total	3,302	144	--	432	1,011	887	508	--	320
All species	5,687	641	--	1,204	1,284	1,073	1,134	--	351
				EASTERN UPPER PENINSULA					
SOFTWOODS									
Red pine	59	59	--	--	--	--	--	--	--
White pine	207	75	--	132	--	--	--	--	--
White spruce	136	--	--	--	136	--	--	--	--
Balsam fir	403	--	--	13	--	--	390	--	--
Hemlock	20	--	--	--	--	--	--	--	20
Northern white-cedar	11	--	--	11	--	--	--	--	--
Total	836	134	--	156	136	--	390	--	20
HARDWOODS									
Soft maple	82	--	--	82	--	--	--	--	--
Balsam poplar	244	--	--	10	--	59	175	--	--
Bigtooth aspen	61	--	--	--	--	--	61	--	--
Quaking aspen	887	--	--	94	--	747	46	--	--
Total	1,274	--	--	186	--	806	282	--	--
All species	2,110	134	--	342	136	806	672	--	20

(Table 16 continued on next page)

(Table 16 continued)

Species group	All types	Jack pine	Red pine	White pine	White spruce	Balsam fir	Northern white-cedar	Oak-hickory	Maple-birch
WESTERN UPPER PENINSULA									
		Forest type[2/]							
SOFTWOODS									
White pine	66	--	--	--	66	--	--	--	--
White spruce	164	--	--	--	22	142	--	--	--
Balsam fir	110	--	--	12	10	44	44	--	--
Hemlock	11	--	--	--	--	--	--	--	11
Tamarack	9	--	--	--	9	--	--	--	--
Total	360	--	--	12	107	186	44	--	11
HARDWOODS									
Basswood	16	--	--	--	--	--	--	--	16
Hard maple	28	--	--	--	--	--	--	--	28
Elm	79	--	--	--	--	49	--	--	30
Balsam poplar	86	--	--	--	--	--	86	--	--
Quaking aspen	1,110	--	--	80	974	32	9	--	15
Total	1,319	--	--	80	974	81	95	--	89
All species	1,679	--	--	92	1,081	267	139	--	100
NORTHERN LOWER PENINSULA									
SOFTWOODS									
Jack pine	201	201	--	--	--	--	--	--	--
Red pine	214	162	--	52	--	--	--	--	--
White pine	78	--	--	78	--	--	--	--	--
Balsam fir	192	--	--	--	-	--	192	--	--
Northern white-cedar	41	--	--	41	--	--	--	--	--
Other softwoods	433	--	--	433	--	--	--	--	--
Total	1,159	363	--	604	--	--	192	--	--
HARDWOODS									
White oak	18	--	--	18	--	--	--	--	--
Select red oak	102	102	--	--	--	--	--	--	--
Other red oak	42	42	--	--	--	--	--	--	--
Soft maple	77	--	--	77	--	--	--	--	--
Balsam poplar	14	--	--	--	--	--	14	--	--
Bigtooth aspen	104	--	--	--	--	--	104	--	--
Quaking aspen	69	--	--	19	37	--	13	--	--
Total	426	144	--	114	37	--	131	--	--
All species	1,585	507	--	718	37	--	323	--	--
SOUTHERN LOWER PENINSULA									
SOFTWOODS									
White spruce	30	--	--	--	30	--	--	--	--
Total	30	--	--	--	30	--	--	--	--
HARDWOODS									
Select red oak	52	--	--	52	--	--	--	--	--
Hard maple	30	--	--	--	--	--	--	--	30
Ash	142	--	--	--	--	--	--	--	142
Quaking aspen	29	--	--	--	--	--	--	--	29
Other hardwoods	30	--	--	--	--	--	--	--	30
Total	283	--	--	52	--	--	--	--	231
All species	313	--	--	52	30	--	--	--	231

[1/] Tables may not add to totals due to rounding.

[2/] Timber stand improvement was a treatment option only in the forest types shown below.

Table 17.--Average annual yields of growing stock from timber stand improvement by forest type, stand age class, and Forest Survey Unit, Michigan, 1981-1990[1/]

(In thousand cubic feet)

Forest type	All ages	Stand-age class (years)					
		1-10	11-20	21-30	31-40	41-50	51+
ALL UNITS							
Jack pine	641	134	360	147	--	--	--
White pine	1,204	--	368	836	--	--	--
White spruce	1,284	--	173	--	1,111	--	--
Balsam fir	1,073	--	--	--	1,073	--	--
Northern white-cedar	1,134	--	--	--	--	1,134	--
Maple-birch	351	142	89	100	20	--	--
All types	5,687	276	990	1,083	2,204	1,134	--
EASTERN UPPER PENINSULA							
Jack pine	134	58	33	43	--	--	--
White pine	342	--	83	259	--	--	--
White spruce	136	--	136	--	--	--	--
Balsam fir	806	--	--	--	806	--	--
Northern white-cedar	672	--	--	--	--	672	--
Maple-birch	20	--	--	--	20	--	--
All types	2,110	58	252	302	826	672	--
WESTERN UPPER PENINSULA							
White pine	92	--	--	92	--	--	--
White spruce	1,081	--	--	--	1,081	--	--
Balsam fir	267	--	--	--	267	--	--
Northern white-cedar	139	--	--	--	--	139	--
Maple-birch	100	--	--	100	--	--	--
All types	1,679	--	--	192	1,348	139	--
NORTHERN LOWER PENINSULA							
Jack pine	507	76	327	104	--	--	--
White pine	718	--	285	433	--	--	--
White spruce	37	--	37	--	--	--	--
Northern white-cedar	323	--	--	--	--	323	--
All types	1,585	76	649	537	--	323	--
SOUTHERN LOWER PENINSULA							
White pine	52	--	--	52	--	--	--
White spruce	30	--	--	--	30	--	--
Maple-birch	231	142	89	--	--	--	--
All types	313	142	89	52	30	--	--

[1/] Tables may not add to totals due to rounding.

Table 18.--Commercial forest area qualifying for treatment and average annual yields of growing stock from each treatment by treatment category and Survey Unit, Michigan, 1991-2000[1/]

Treatment	All units	Forest Survey Unit: Eastern Upper Peninsula	Western Upper Peninsula	Northern Lower Peninsula	Southern Lower Peninsula
COMMERCIAL FOREST AREA					
		In thousand acres			
Harvest	2,531.0	550.4	640.5	1,045.5	294.6
Thinning	2,636.8	488.3	981.4	915.9	251.2
Timber stand improvement	448.6	109.6	123.9	137.2	77.9
No treatment	11,654.5	2,576.3	2,701.5	4,598.5	1,778.2
Total	17,270.9	3,724.6	4,447.3	6,697.1	2,401.9
AVERAGE ANNUAL YIELDS OF GROWING STOCK					
		In thousand cubic feet			
Harvest	528,393	108,595	141,816	214,010	63,972
Thinning	136,546	22,971	47,351	55,305	10,919
Timber stand improvement	2,015	1,022	381	612	--
Total	666,954	132,588	189,548	269,927	74,891

[1/] Tables may not add to totals due to rounding.

Table 19.--Commercial forest area qualifying for harvest by forest type, stand-age class, and Forest Survey Unit, Michigan, 1991-2000[1/]

(In thousand acres)

ALL UNITS

Forest type	All ages	Stand-age class (years)										
		1-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	149.0	--	--	--	104.2	43.2	1.6	--	--	--	--	--
Red pine	109.3	--	--	62.4	37.4	--	4.8	1.3	3.2	0.2	--	--
White pine	25.5	--	--	--	--	--	0.3	2.0	--	13.7	9.6	--
White spruce	13.0	--	--	1.1	--	1.5	2.1	4.8	2.2	--	1.4	--
Black spruce	65.4	--	--	--	18.4	18.4	20.8	7.8	--	--	--	--
Balsam fir	110.9	--	--	--	17.9	33.9	35.4	19.0	4.7	--	--	--
Tamarack	13.8	--	--	--	--	5.8	5.0	1.7	--	1.3	--	--
Northern white-cedar	147.1	--	--	--	--	--	--	1.0	--	45.1	97.2	3.9
Oak-hickory	229.0	--	--	--	--	--	0.4	58.0	94.2	40.9	35.5	--
Elm-ash-maple	151.1	--	--	--	--	--	--	33.2	70.1	24.9	17.8	5.2
Maple-birch	674.3	--	--	--	--	--	--	53.7	181.7	77.8	361.2	--
Aspen	760.2	--	--	72.3	406.0	281.9	--	--	--	--	--	--
Paper birch	68.5	--	--	1.1	--	4.0	60.3	3.2	--	--	--	--
Exotic	13.8	--	9.2	4.6	--	--	--	--	--	--	--	--
All types	2,531.1	--	9.2	141.5	583.8	388.6	130.7	185.5	356.1	203.8	522.7	9.1
EASTERN UPPER PENINSULA												
Jack pine	37.0	--	--	--	30.8	6.1	--	--	--	--	--	--
Red pine	24.6	--	--	14.3	10.3	--	--	--	--	--	--	--
White pine	8.2	--	--	--	--	--	--	--	--	1.3	6.9	--
White spruce	3.7	--	--	--	--	--	0.4	2.8	0.5	--	--	--
Black spruce	34.8	--	--	--	18.4	16.4	--	--	--	--	--	--
Balsam fir	37.3	--	--	--	17.9	19.5	--	--	--	--	--	--
Tamarack	5.5	--	--	--	--	0.5	3.3	1.7	--	--	--	--
Northern white-cedar	76.5	--	--	--	--	--	--	--	--	28.2	48.3	--
Oak-hickory	2.5	--	--	--	--	--	0.4	--	1.5	0.6	--	--
Elm-ash-maple	21.7	--	--	--	--	--	--	--	6.1	13.2	2.4	--
Maple-birch	125.8	--	--	--	--	--	--	--	--	33.8	92.0	--
Aspen	150.8	--	--	--	117.4	33.4	--	--	--	--	--	--
Paper birch	21.5	--	--	--	--	3.8	17.7	--	--	--	--	--
Exotic	0.4	--	0.4	--	--	--	--	--	--	--	--	--
All types	550.4	--	0.4	14.3	194.8	79.7	21.8	4.5	8.1	77.1	149.7	--

(Table 19 continued on next page)

(Table 19 continued)

Forest type	All ages	Stand-age class (years) 1-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
WESTERN UPPER PENINSULA												
Jack pine	14.8	--	--	--	--	14.8	--	--	--	--	--	--
Red pine	9.5	--	--	--	--	--	4.8	1.3	3.2	0.2	--	--
White pine	5.1	--	--	--	--	--	--	--	--	2.5	2.7	--
White spruce	6.6	--	--	--	--	1.5	1.7	2.0	--	--	1.4	--
Black spruce	27.5	--	--	--	--	0.8	18.9	7.8	--	--	--	--
Balsam fir	67.3	--	--	--	--	14.4	35.4	17.5	--	--	--	--
Tamarack	5.1	--	--	--	--	3.4	0.3	--	--	1.3	--	--
Northern white-cedar	25.3	--	--	--	--	--	--	--	--	--	21.4	3.9
Oak-hickory	2.2	--	--	--	--	--	--	--	--	--	2.2	--
Elm-ash-maple	20.6	--	--	--	--	--	--	--	--	--	15.4	5.2
Maple-birch	269.2	--	--	--	--	--	--	--	--	--	269.2	--
Aspen	159.5	--	--	--	60.4	99.1	--	--	--	--	--	--
Paper birch	27.9	--	--	--	--	0.2	24.6	3.2	--	--	--	--
All types	640.5	--	--	--	60.4	134.1	85.8	31.7	3.2	4.0	312.2	9.1
NORTHERN LOWER PENINSULA												
Jack pine	94.8	--	--	--	72.5	22.3	--	--	--	--	--	--
Red pine	70.7	--	--	48.2	22.6	--	--	--	--	--	--	--
White pine	9.9	--	--	--	--	--	--	--	--	9.9	--	--
White spruce	1.7	--	--	--	--	--	--	--	1.7	--	--	--
Black spruce	3.1	--	--	--	--	1.1	1.9	--	--	--	--	--
Balsam fir	6.2	--	--	--	--	--	--	1.5	4.7	--	--	--
Tamarack	3.2	--	--	--	--	1.9	1.3	--	--	--	--	--
Northern white-cedar	44.4	--	--	--	--	--	--	--	--	16.9	27.5	--
Oak-hickory	136.5	--	--	--	--	--	--	58.0	68.9	9.6	--	--
Elm-ash-maple	42.9	--	--	--	--	--	--	12.8	22.3	7.8	--	--
Maple-birch	189.1	--	--	--	--	--	--	53.7	132.3	3.1	--	--
Aspen	416.5	--	--	49.2	217.8	149.4	--	--	--	--	--	--
Paper birch	18.0	--	--	--	--	--	18.0	--	--	--	--	--
Exotic	8.5	--	7.0	1.5	--	--	--	--	--	--	--	--
All types	1,045.5	--	7.0	98.8	312.9	174.8	21.3	126.0	229.9	47.4	27.5	--
SOUTHERN LOWER PENINSULA												
Jack pine	2.5	--	--	--	0.9	--	1.6	--	--	--	--	--
Red pine	4.5	--	--	--	4.5	--	--	--	--	--	--	--
White pine	2.2	--	--	--	--	--	0.3	2.0	--	--	--	--
White spruce	1.1	--	--	1.1	--	--	--	--	--	--	--	--
Northern white-cedar	1.0	--	--	--	--	--	--	1.0	--	--	--	--
Oak-hickory	87.8	--	--	--	--	--	--	--	23.8	30.6	33.4	--
Elm-ash-maple	65.9	--	--	--	--	--	--	20.4	41.7	3.8	--	--
Maple-birch	90.2	--	--	--	--	--	--	--	49.4	40.8	--	--
Aspen	33.4	--	--	23.1	10.3	--	--	--	--	--	--	--
Paper birch	1.1	--	--	1.1	--	--	--	--	--	--	--	--
Exotic	5.0	--	1.8	3.2	--	--	--	--	--	--	--	--
All types	294.6	--	1.8	28.5	15.7	--	1.9	23.3	114.9	75.3	33.4	--

1/ Tables may not add to totals due to rounding.

Table 20.--Average annual yields from harvest by species group, tree class, and Forest Survey Unit, Michigan, 1991-2000[1/]

(In thousand cubic feet)

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
ALL UNITS						
SOFTWOODS						
Jack pine	21,795	8,336	13,459	453	66	387
Red pine	28,810	4,607	24,203	160	36	124
White pine	17,488	1,193	16,295	372	96	276
White spruce	16,673	2,325	14,348	133	24	109
Black spruce	8,607	6,606	2,001	51	--	51
Balsam fir	28,486	14,921	13,565	283	36	247
Hemlock	12,445	1,073	11,372	701	265	436
Tamarack	1,398	606	792	25	11	14
Northern white-cedar	33,567	14,210	19,357	3,401	616	2,785
Other softwoods	1,275	1,014	261	77	--	77
Total	170,544	54,891	115,653	5,656	1,150	4,506
HARDWOODS						
White oak	14,463	1,639	12,824	673	213	460
Select red oak	27,453	2,387	25,066	1,247	295	952
Other red oak	6,579	898	5,681	269	95	174
Hickory	2,542	374	2,168	87	60	27
Basswood	11,959	1,050	10,909	442	143	299
Beech	6,256	1,198	5,058	920	215	705
Yellow birch	8,912	1,637	7,275	1,488	421	1,067
Hard maple	57,302	12,012	45,290	3,668	974	2,694
Soft maple	70,620	17,299	53,321	4,227	957	3,270
Elm	4,472	1,242	3,230	219	68	151
Ash	10,023	3,199	6,824	387	72	315
Cottonwood	277	--	277	--	--	--
Balsam poplar	8,846	894	7,952	292	10	282
Bigtooth aspen	36,744	6,579	30,165	1,851	280	1,571
Quaking aspen	58,289	9,903	48,386	3,424	331	3,093
Paper birch	22,628	8,438	14,190	1,254	80	1,174
Black cherry	8,007	1,647	6,360	627	187	440
Other hardwoods	2,477	481	1,996	147	37	110
Total	357,849	70,877	286,972	21,222	4,438	16,784
All species	528,393	125,768	402,625	26,878	5,588	21,290
EASTERN UPPER PENINSULA						
SOFTWOODS						
Jack pine	5,932	2,763	3,169	64	4	60
Red pine	6,104	1,080	5,024	32	--	32
White pine	4,045	150	3,895	146	10	136
White spruce	5,704	733	4,971	51	--	51
Black spruce	4,126	3,304	822	7	--	7
Balsam fir	10,526	6,222	4,304	118	12	106
Hemlock	3,681	371	3,310	209	47	162
Tamarack	707	303	404	14	11	3
Northern white-cedar	13,937	6,144	7,793	925	92	833
Other softwoods	69	37	32	1	--	1
Total	54,831	21,107	33,724	1,567	176	1,391
HARDWOODS						
White oak	4	--	4	--	--	--
Select red oak	413	50	363	111	3	108
Basswood	918	116	802	122	69	53
Beech	2,611	388	2,223	472	89	383
Yellow birch	1,824	219	1,605	304	57	247
Hard maple	9,088	1,800	7,288	411	93	318
Soft maple	12,314	3,222	9,092	1,123	145	978
Elm	443	105	338	36	--	36
Ash	1,021	584	437	84	15	69
Balsam poplar	3,771	469	3,302	72	10	62
Bigtooth aspen	1,609	504	1,105	81	--	81
Quaking aspen	12,057	2,847	9,210	697	72	625
Paper birch	6,988	2,799	4,189	435	7	428
Black cherry	690	126	564	113	18	95
Other hardwoods	13	--	13	--	--	--
Total	53,764	13,229	40,535	4,061	578	3,483
All species	108,595	34,336	74,259	5,628	754	4,874

(Table 20 continued on next page)

(Table 20 continued)

WESTERN UPPER PENINSULA

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
SOFTWOODS						
Jack pine	2,377	375	2,002	43	--	43
Red pine	2,409	236	2,173	23	21	2
White pine	3,640	69	3,571	83	16	67
White spruce	10,330	1,341	8,989	69	24	45
Black spruce	3,792	2,765	1,027	35	--	35
Balsam fir	14,495	7,241	7,254	118	24	94
Hemlock	6,926	260	6,666	446	198	248
Tamarack	482	203	279	4	--	4
Northern white-cedar	7,140	1,735	5,405	1,083	208	875
Other softwoods	13	--	13	6	--	6
Total	51,604	14,225	37,379	1,910	491	1,419
HARDWOODS						
Select red oak	1,304	184	1,120	49	9	40
Basswood	2,911	400	2,511	88	27	61
Yellow birch	6,241	1,172	5,069	1,097	332	765
Hard maple	27,806	5,721	22,085	2,362	560	1,802
Soft maple	16,029	4,893	11,136	1,419	293	1,126
Elm	2,237	377	1,860	101	46	55
Ash	1,351	424	927	67	5	62
Balsam poplar	1,687	129	1,558	2	--	2
Bigtooth aspen	4,342	665	3,677	306	89	217
Quaking aspen	18,161	2,713	15,448	1,285	190	1,095
Paper birch	6,527	1,905	4,622	471	46	425
Black cherry	1,616	497	1,119	148	--	148
Total	90,212	19,080	71,132	7,395	1,597	5,798
All species	141,816	33,305	108,511	9,305	2,088	7,217
NORTHERN LOWER PENINSULA						
SOFTWOODS						
Jack pine	13,017	5,062	7,955	346	62	284
Red pine	19,083	3,187	15,896	24	14	10
White pine	6,871	818	6,053	30	30	--
White spruce	580	221	359	13	--	13
Black spruce	689	537	152	9	--	9
Balsam fir	3,465	1,458	2,007	47	--	47
Hemlock	1,647	387	1,260	46	20	26
Tamarack	209	100	109	7	--	7
Northern white-cedar	12,428	6,316	6,112	1,393	316	1,077
Other softwoods	796	735	61	52	--	52
Total	58,785	18,821	39,964	1,967	442	1,525
HARDWOODS						
White oak	6,293	1,113	5,180	266	89	177
Select red oak	17,926	1,740	16,186	853	225	628
Other red oak	4,300	778	3,522	192	18	174
Basswood	5,707	442	5,265	128	37	91
Beech	2,347	547	1,800	432	126	306
Yellow birch	719	219	500	50	8	42
Hard maple	17,596	4,176	13,420	801	321	480
Soft maple	27,515	7,107	20,408	1,123	307	816
Elm	878	290	588	41	22	19
Ash	4,576	1,223	3,353	107	25	82
Cottonwood	105	--	105	--	--	--
Balsam poplar	3,203	292	2,911	218	--	218
Bigtooth aspen	28,571	4,991	23,580	1,440	191	1,249
Quaking aspen	25,101	3,677	21,424	1,258	69	1,189
Paper birch	8,210	3,149	5,061	348	27	321
Black cherry	2,064	391	1,673	182	22	160
Other hardwoods	114	52	62	--	--	--
Total	155,225	30,187	125,038	7,439	1,487	5,952
All species	214,010	49,008	165,002	9,406	1,929	7,477

(Table 20 continued on next page)

(Table 20 continued)

SOUTHERN LOWER PENINSULA

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
SOFTWOODS						
Jack pine	469	136	333	--	--	--
Red pine	1,214	104	1,110	81	1	80
White pine	2,932	156	2,776	113	40	73
White spruce	59	30	29	--	--	--
Hemlock	191	55	136	--	--	--
Northern white-cedar	62	15	47	--	--	--
Other softwoods	397	242	155	18	--	18
Total	5,324	738	4,586	212	41	171
HARDWOODS						
White oak	8,166	526	7,640	407	124	283
Select red oak	7,810	413	7,397	234	58	176
Other red oak	2,279	120	2,159	77	77	--
Hickory	2,542	374	2,168	87	60	27
Basswood	2,423	92	2,331	104	10	94
Beech	1,298	263	1,035	16	--	16
Yellow birch	128	27	101	37	24	13
Hard maple	2,812	315	2,497	94	--	94
Soft maple	14,762	2,077	12,685	562	212	350
Elm	914	470	444	41	--	41
Ash	3,075	968	2,107	129	27	102
Cottonwood	172	--	172	--	--	--
Balsam poplar	185	4	181	--	--	--
Bigtooth aspen	2,222	419	1,803	24	--	24
Quaking aspen	2,970	666	2,304	184	--	184
Paper birch	903	585	318	--	--	--
Black cherry	3,637	633	3,004	184	147	37
Other hardwoods	2,350	429	1,921	147	37	110
Total	58,648	8,381	50,267	2,327	776	1,551
All species	63,972	9,119	54,853	2,539	817	1,722

[1/] Tables may not add to totals due to rounding.
[2/] Rough and rotten cull.

Table 21.--Average annual yields of growing stock from harvest by species group, forest type, and Forest Survey Unit, Michigan, 1991-2000[1/]

(In thousand cubic feet)

ALL UNITS

Species group	All types	Forest type: Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	21,795	17,131	2,376	151	4	149	20	43	--	730	--	64	1,127	--	--
Red pine	28,810	2,543	19,664	458	22	147	229	--	--	933	--	1,157	3,032	62	563
White pine	17,488	469	848	5,113	139	380	898	--	1,055	715	301	4,845	2,541	184	--
White spruce	16,673	--	--	170	2,011	303	3,520	--	641	7	504	2,586	5,905	1,006	20
Black spruce	8,607	150	32	75	7	5,031	907	258	910	--	81	112	975	69	--
Balsam fir	28,486	--	161	25	277	867	9,087	211	2,033	--	865	3,737	10,277	946	--
Hemlock	12,445	--	--	108	--	10	222	--	307	153	785	10,444	370	46	--
Tamarack	1,398	--	--	11	--	264	32	749	89	--	72	--	176	5	--
Northern white-cedar	33,567	--	--	20	222	777	1,539	134	20,409	--	1,755	3,666	4,015	1,030	--
Other softwoods	1,275	--	--	--	74	--	14	--	--	--	--	13	--	--	1,174
Total	170,544	20,293	23,081	6,131	2,756	7,928	16,468	1,395	25,444	2,538	4,363	26,624	28,418	3,348	1,757
HARDWOODS															
White oak	14,463	63	48	369	--	--	--	--	--	10,358	1,269	1,521	835	--	--
Select red oak	27,453	1,632	290	283	--	--	--	--	--	16,444	740	3,458	4,393	123	90
Other red oak	6,579	295	451	--	--	--	--	--	--	4,779	--	460	594	--	--
Hickory	2,542	10	--	--	--	--	--	--	--	1,280	164	1,088	--	--	--
Basswood	11,959	48	--	--	--	--	--	--	32	182	751	9,899	872	160	15
Beech	6,256	--	--	--	--	--	--	--	--	74	118	5,544	520	--	--
Yellow birch	8,912	--	--	6	10	24	388	--	272	5	848	6,909	410	40	--
Hard maple	57,302	27	--	119	70	--	292	--	--	163	723	52,522	2,958	400	28
Soft maple	70,620	133	237	185	140	122	2,319	--	1,172	3,569	17,816	25,274	18,287	1,366	--
Elm	4,472	23	--	--	--	--	225	--	--	162	664	2,329	1,020	49	--
Ash	10,023	--	9	--	--	34	57	13	334	214	3,518	3,808	1,798	229	9
Cottonwood	277	--	--	--	--	--	--	--	--	37	--	73	167	--	--
Balsam poplar	8,846	--	--	--	124	15	369	56	589	--	337	269	6,985	102	--
Bigtooth aspen	36,744	188	372	9	--	--	168	--	--	2,499	206	1,994	31,144	164	--
Quaking aspen	58,289	688	368	118	249	429	1,336	35	337	622	640	4,211	48,145	1,044	67
Paper birch	22,628	15	169	130	4	655	1,457	85	1,119	494	137	2,093	9,837	6,433	--
Black cherry	8,007	16	--	--	40	17	175	--	14	1,058	386	4,982	1,127	--	192
Other hardwoods	2,477	11	--	--	--	--	--	--	13	485	988	948	32	--	--
Total	357,849	3,149	1,944	1,219	637	1,296	6,786	189	3,882	42,425	29,305	127,382	129,124	10,110	401
All species	528,393	23,442	25,025	7,350	3,393	9,224	23,254	1,584	29,326	44,963	33,668	154,006	157,542	13,458	2,158

(Table 21 continued on next page)

(Table 21 continued)

EASTERN UPPER PENINSULA

Species group	All types	Forest type: Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	5,932	4,344	858	7	4	104	--	--	--	--	--	--	615	--	--
Red pine	6,104	766	4,563	121	22	129	--	--	--	19	--	16	453	--	15
White pine	4,045	--	89	1,173	20	343	379	--	443	37	150	935	443	33	--
White spruce	5,704	--	--	101	572	126	790	--	336	7	89	497	2,958	208	20
Black spruce	4,126	150	--	23	7	2,513	273	29	415	--	19	60	637	--	--
Balsam fir	10,526	--	--	15	81	356	2,734	37	1,066	--	300	1,014	4,493	430	--
Hemlock	3,681	--	--	44	--	10	67	--	197	--	380	2,871	66	46	--
Tamarack	707	--	--	11	--	83	32	442	35	--	--	--	104	--	--
Northern white-cedar	13,937	--	--	20	123	396	535	17	10,237	--	669	716	963	261	--
Other softwoods	69	--	--	--	--	--	14	--	--	--	--	--	--	--	55
Total	54,831	5,260	5,510	1,515	829	4,060	4,824	525	12,729	63	1,607	6,109	10,732	978	90
HARDWOODS															
White oak	4	--	--	--	--	--	--	--	--	4	--	--	--	--	--
Select red oak	413	55	--	--	--	--	--	--	--	150	35	36	137	--	--
Basswood	918	--	--	--	--	--	--	--	--	41	--	751	126	--	--
Beech	2,611	--	--	--	--	--	--	--	--	--	31	2,580	--	--	--
Yellow birch	1,824	--	--	--	10	11	196	--	119	--	262	1,202	24	--	--
Hard maple	9,088	--	--	--	4	--	38	--	--	6	115	8,701	224	--	--
Soft maple	12,314	--	119	51	47	50	749	--	624	19	2,134	6,374	1,699	448	--
Elm	443	--	--	--	--	--	84	--	--	--	--	189	170	--	--
Ash	1,021	--	--	--	--	--	26	--	102	--	421	101	219	152	--
Balsam poplar	3,771	--	--	--	17	15	108	7	148	--	64	82	3,320	10	--
Bigtooth aspen	1,609	34	170	--	--	--	15	--	--	--	--	13	1,377	--	--
Quaking aspen	12,057	--	23	60	67	319	452	--	134	3	55	309	10,186	449	--
Paper birch	6,988	15	--	61	4	402	623	--	690	54	49	339	2,868	1,883	--
Black cherry	690	--	--	--	--	17	32	--	--	--	--	437	204	--	--
Other hardwoods	13	--	--	--	--	--	--	--	--	--	--	13	--	--	--
Total	53,764	104	312	172	149	814	2,323	7	1,817	277	3,166	21,127	20,554	2,942	--
All species	108,595	5,364	5,822	1,687	978	4,874	7,147	532	14,546	340	4,773	27,236	31,286	3,920	90

(Table 21 continued on next page)

(Table 21 continued)

WESTERN UPPER PENINSULA

Species group	All types	Forest type: Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	2,377	2,198	45	53	--	45	20	--	--	--	--	--	16	--	--
Red pine	2,409	262	1,355	--	--	18	199	--	--	7	--	17	516	35	--
White pine	3,640	--	511	1,209	119	37	324	--	78	--	70	721	482	89	--
White spruce	10,330	--	--	69	1,290	177	2,730	--	129	--	370	2,053	2,758	754	--
Black spruce	3,792	--	32	10	--	2,239	634	141	215	--	62	52	338	69	--
Balsam fir	14,495	--	161	10	167	500	6,120	103	679	--	390	2,555	3,414	396	--
Hemlock	6,926	--	--	64	--	--	155	--	7	--	193	6,432	75	--	--
Tamarack	482	--	--	--	--	181	--	242	7	--	--	--	52	--	--
Northern white-cedar	7,140	--	--	--	35	381	854	102	2,678	--	426	2,037	459	168	--
Other softwoods	13	--	--	--	--	--	--	--	--	--	--	13	--	--	--
Total	51,604	2,460	2,104	1,415	1,611	3,578	11,036	588	3,793	7	1,511	13,880	8,110	1,511	--
HARDWOODS															
Select red oak	1,304	142	54	46	--	--	--	--	--	276	--	564	109	113	--
Basswood	2,911	--	--	--	--	--	--	--	--	--	78	2,601	232	--	--
Yellow birch	6,241	--	--	6	--	13	192	--	116	5	237	5,312	360	--	--
Hard maple	27,806	--	--	119	66	--	198	--	--	--	321	25,428	1,324	350	--
Soft maple	16,029	--	96	65	93	72	1,436	--	157	24	899	9,417	3,137	633	--
Elm	2,237	--	--	--	--	--	141	--	--	--	201	1,318	577	--	--
Ash	1,351	--	--	--	--	34	31	--	57	--	617	376	209	27	--
Balsam poplar	1,687	--	--	--	--	--	261	20	27	--	--	122	1,165	92	--
Bigtooth aspen	4,342	52	158	--	--	--	137	--	--	--	--	245	3,640	110	--
Quaking aspen	18,161	--	198	37	168	110	744	22	25	20	70	1,742	14,668	357	--
Paper birch	6,527	--	148	68	--	253	702	11	181	--	5	601	1,688	2,870	--
Black cherry	1,616	--	--	--	--	--	143	--	14	--	3	1,276	180	--	--
Total	90,212	194	654	341	327	482	3,985	53	577	325	2,431	49,002	27,289	4,552	--
All species	141,816	2,654	2,758	1,756	1,938	4,060	15,021	641	4,370	332	3,942	62,882	35,399	6,063	--

(Table 21 continued on next page)

(Table 21 continued)

NORTHERN LOWER PENINSULA

Species group	All types	Forest type: Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	13,017	10,208	1,437	91	--	--	--	43	--	678	--	64	496	--	--
Red pine	19,083	1,515	12,758	337	--	--	30	--	--	787	--	1,124	2,001	27	504
White pine	6,871	469	185	1,618	--	--	195	--	534	438	81	1,673	1,616	62	--
White spruce	580	--	--	--	90	--	--	--	176	--	45	36	189	44	--
Black spruce	689	--	--	42	--	279	--	88	280	--	--	--	--	--	--
Balsam fir	3,465	--	--	--	29	11	233	71	288	--	175	168	2,370	120	--
Hemlock	1,647	--	--	--	--	--	--	--	103	67	165	1,083	229	--	--
Tamarack	209	--	--	--	--	--	--	65	47	--	72	--	20	5	--
Northern white-cedar	12,428	--	--	--	64	--	150	15	7,432	--	660	913	2,593	601	--
Other softwoods	796	--	--	--	--	--	--	--	--	--	--	--	--	--	796
Total	58,785	12,192	14,380	2,088	183	290	608	282	8,860	1,970	1,198	5,061	9,514	859	1,300
HARDWOODS															
White oak	6,293	63	48	366	--	--	--	--	--	4,707	101	256	752	--	--
Select red oak	17,926	1,435	236	196	--	--	--	--	--	10,928	--	1,130	3,936	10	55
Other red oak	4,300	295	451	--	--	--	--	--	--	2,960	--	--	594	--	--
Basswood	5,707	48	--	--	--	--	--	--	32	--	301	4,759	514	38	15
Beech	2,347	--	--	--	--	--	--	--	--	22	24	1,816	485	--	--
Yellow birch	719	--	--	--	--	--	--	--	37	--	248	368	26	40	--
Hard maple	17,596	27	--	--	--	--	56	--	--	51	257	15,717	1,410	50	28
Soft maple	27,515	71	22	69	--	--	134	--	391	2,078	5,049	6,754	12,701	246	--
Elm	878	23	--	--	--	--	--	--	--	22	138	373	273	49	--
Ash	4,576	--	9	--	--	--	--	13	175	48	1,098	2,091	1,083	50	9
Cottonwood	105	--	--	--	--	--	--	--	--	--	--	33	72	--	--
Balsam poplar	3,203	--	--	--	107	--	--	29	414	--	101	65	2,487	--	--
Bigtooth aspen	28,571	102	44	9	--	--	16	--	--	1,992	22	1,552	24,780	54	--
Quaking aspen	25,101	688	147	21	14	--	140	13	172	282	353	1,930	21,114	227	--
Paper birch	8,210	--	21	1	--	--	132	74	248	371	40	1,120	4,582	1,621	--
Black cherry	2,064	16	--	--	--	--	--	--	--	105	100	1,314	501	--	28
Other hardwoods	114	--	--	--	--	--	--	--	--	52	--	30	32	--	--
Total	155,225	2,768	978	662	121	--	478	129	1,469	23,618	7,832	39,308	75,342	2,385	135
All species	214,010	14,960	15,358	2,750	304	290	1,086	411	10,329	25,588	9,030	44,369	84,856	3,244	1,435

(Table 21 continued on next page)

(Table 21 continued)

SOUTHERN LOWER PENINSULA

Species group	All types	Forest type: Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	469	381	36	--	--	--	--	--	--	52	--	--	--	--	--
Red pine	1,214	--	988	--	--	--	--	--	--	120	--	--	62	--	44
White pine	2,932	--	63	1,113	--	--	--	--	--	240	--	1,516	--	--	--
White spruce	59	--	--	--	59	--	--	--	--	--	--	--	--	--	--
Hemlock	191	--	--	--	--	--	--	--	--	86	47	58	--	--	--
Northern white-cedar	62	--	--	--	--	--	--	--	62	--	--	--	--	--	--
Other softwoods	397	--	--	--	74	--	--	--	--	--	--	--	--	--	323
Total	5,324	381	1,087	1,113	133	--	--	--	62	498	47	1,574	62	--	367
HARDWOODS															
White oak	8,166	--	--	3	--	--	--	--	--	5,647	1,168	1,265	83	--	--
Select red oak	7,810	--	--	41	--	--	--	--	--	5,090	705	1,728	211	--	35
Other red oak	2,279	--	--	--	--	--	--	--	--	1,819	--	460	--	--	--
Hickory	2,542	10	--	--	--	--	--	--	--	1,280	164	1,088	--	--	--
Basswood	2,423	--	--	--	--	--	--	--	--	141	372	1,788	--	122	--
Beech	1,298	--	--	--	--	--	--	--	--	52	63	1,148	35	--	--
Yellow birch	128	--	--	--	--	--	--	--	--	--	101	27	--	--	--
Hard maple	2,812	--	--	--	--	--	--	--	--	106	30	2,676	--	--	--
Soft maple	14,762	62	--	--	--	--	--	--	--	1,448	9,734	2,729	750	39	--
Elm	914	--	--	--	--	--	--	--	--	140	325	449	--	--	--
Ash	3,075	--	--	--	--	--	--	--	--	166	1,382	1,240	287	--	--
Cottonwood	172	--	--	--	--	--	--	--	--	37	--	40	95	--	--
Balsam poplar	185	--	--	--	--	--	--	--	--	--	172	--	13	--	--
Bigtooth aspen	2,222	--	--	--	--	--	--	--	--	507	184	184	1,347	--	--
Quaking aspen	2,970	--	--	--	--	--	--	--	6	317	162	230	2,177	11	67
Paper birch	903	--	--	--	--	--	--	--	--	69	43	33	699	59	--
Black cherry	3,637	--	--	--	40	--	--	--	--	953	283	1,955	242	--	164
Other hardwoods	2,350	11	--	--	--	--	--	--	13	433	988	905	--	--	--
Total	58,648	83	--	44	40	--	--	--	19	18,205	15,876	17,945	5,939	231	266
All species	63,972	464	1,087	1,157	173	--	--	--	81	18,703	15,923	19,519	6,001	231	633

1/ Tables may not add to totals due to rounding.

Table 22.--Average annual yields of growing stock from harvest by forest type, stand-age class, and Forest Survey Unit, Michigan, 1991-2000[1/]

(In thousand cubic feet)

ALL UNITS

Forest type	All ages	Stand-age class (years) 1-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	23,442	--	--	--	16,593	6,548	301	--	--	--	--	--
Red pine	25,025	--	--	14,146	8,121	--	1,463	310	953	32	--	--
White pine	7,350	--	--	--	--	--	101	1,056	--	3,863	2,330	--
White spruce	3,393	--	--	173	--	289	835	1,277	473	--	346	--
Black spruce	9,224	--	--	--	2,751	2,435	2,938	1,100	--	--	--	--
Balsam fir	23,254	--	--	--	3,819	6,638	8,085	3,827	885	--	--	--
Tamarack	1,584	--	--	--	--	704	473	163	--	244	--	--
Northern white-cedar	29,326	--	--	--	--	--	--	81	--	10,022	18,587	636
Oak-hickory	44,963	--	--	--	--	--	43	11,410	17,781	7,733	7,996	--
Elm-ash-maple	33,668	--	--	--	--	--	--	7,184	16,306	6,029	3,128	1,021
Maple-birch	154,006	--	--	--	--	--	--	11,540	43,669	15,661	83,136	--
Aspen	157,542	--	--	12,849	85,570	59,123	--	--	--	--	--	--
Paper birch	13,458	--	--	231	--	889	11,708	630	--	--	--	--
Exotic	2,158	--	1,439	719	--	--	--	--	--	--	--	--
All types	528,393	--	1,439	28,118	116,854	76,626	25,947	38,578	80,067	43,584	115,523	1,657

EASTERN UPPER PENINSULA

Jack pine	5,364	--	--	--	4,452	912	--	--	--	--	--	--
Red pine	5,822	--	--	3,675	2,147	--	--	--	--	--	--	--
White pine	1,687	--	--	--	--	--	--	--	--	237	1,450	--
White spruce	978	--	--	--	--	--	137	672	169	--	--	--
Black spruce	4,874	--	--	--	2,751	2,123	--	--	--	--	--	--
Balsam fir	7,147	--	--	--	3,819	3,328	--	--	--	--	--	--
Tamarack	532	--	--	--	--	20	349	163	--	--	--	--
Northern white-cedar	14,546	--	--	--	--	--	--	--	--	5,839	8,707	--
Oak-hickory	340	--	--	--	--	--	43	--	154	143	--	--
Elm-ash-maple	4,773	--	--	--	--	--	--	--	1,432	3,134	207	--
Maple-birch	27,236	--	--	--	--	--	--	--	--	6,982	20,254	--
Aspen	31,286	--	--	--	24,932	6,354	--	--	--	--	--	--
Paper birch	3,920	--	--	--	--	853	3,067	--	--	--	--	--
Exotic	90	--	90	--	--	--	--	--	--	--	--	--
All types	108,595	--	90	3,675	38,101	13,590	3,596	835	1,755	16,335	30,618	--

(Table 22 continued on next page)

(Table 22 continued)

Forest type	All ages	Stand-age class (years) 1-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
WESTERN UPPER PENINSULA												
Jack pine	2,654	--	--	--	--	2,654	--	--	--	--	--	--
Red pine	2,758	--	--	--	--	--	1,463	310	953	32	--	--
White pine	1,756	--	--	--	--	--	--	--	--	876	880	--
White spruce	1,938	--	--	--	--	289	698	605	--	--	346	--
Black spruce	4,060	--	--	--	--	158	2,802	1,100	--	--	--	--
Balsam fir	15,021	--	--	--	--	3,310	8,085	3,626	--	--	--	--
Tamarack	641	--	--	--	--	390	7	--	--	244	--	--
Northern white-cedar	4,370	--	--	--	--	--	--	--	--	--	3,734	636
Oak-hickory	332	--	--	--	--	--	--	--	--	--	332	--
Elm-ash-maple	3,942	--	--	--	--	--	--	--	--	--	2,921	1,021
Maple-birch	62,882	--	--	--	--	--	--	--	--	--	62,882	--
Aspen	35,399	--	--	--	14,024	21,375	--	--	--	--	--	--
Paper birch	6,063	--	--	--	--	36	5,397	630	--	--	--	--
All types	141,816	--	--	--	14,024	28,212	18,452	6,271	953	1,152	71,095	1,657
NORTHERN LOWER PENINSULA												
Jack pine	14,960	--	--	--	11,978	2,982	--	--	--	--	--	--
Red pine	15,358	--	--	10,471	4,887	--	--	--	--	--	--	--
White pine	2,750	--	--	--	--	--	--	--	--	2,750	--	--
White spruce	304	--	--	--	--	--	--	--	304	--	--	--
Black spruce	290	--	--	--	--	154	136	--	--	--	--	--
Balsam fir	1,086	--	--	--	--	--	--	201	885	--	--	--
Tamarack	411	--	--	--	--	294	117	--	--	--	--	--
Northern white-cedar	10,329	--	--	--	--	--	--	--	--	4,183	6,146	--
Oak-hickory	25,588	--	--	--	--	--	--	11,410	12,889	1,289	--	--
Elm-ash-maple	9,030	--	--	--	--	--	--	2,724	4,590	1,716	--	--
Maple-birch	44,369	--	--	--	--	--	--	11,540	32,217	612	--	--
Aspen	84,856	--	--	9,332	44,130	31,394	--	--	--	--	--	--
Paper birch	3,244	--	--	--	--	--	3,244	--	--	--	--	--
Exotic	1,435	--	1,128	307	--	--	--	--	--	--	--	--
All types	214,010	--	1,128	20,110	60,995	34,824	3,497	25,875	50,885	10,550	6,146	--
SOUTHERN LOWER PENINSULA												
Jack pine	464	--	--	--	163	--	301	--	--	--	--	--
Red pine	1,087	--	--	--	1,087	--	--	--	--	--	--	--
White pine	1,157	--	--	--	--	--	101	1,056	--	--	--	--
White spruce	173	--	--	173	--	--	--	--	--	--	--	--
Northern white-cedar	81	--	--	--	--	--	--	81	--	--	--	--
Oak-hickory	18,703	--	--	--	--	--	--	--	4,738	6,301	7,664	--
Elm-ash-maple	15,923	--	--	--	--	--	--	4,460	10,284	1,179	--	--
Maple-birch	19,519	--	--	--	--	--	--	--	11,452	8,067	--	--
Aspen	6,001	--	--	3,517	2,484	--	--	--	--	--	--	--
Paper birch	231	--	--	231	--	--	--	--	--	--	--	--
Exotic	633	--	221	412	--	--	--	--	--	--	--	--
All types	63,972	--	221	4,333	3,734	--	402	5,597	26,474	15,547	7,664	--

1/ Tables may not add to totals due to rounding.

Table 23.--Commercial forest area qualifying for thinning by forest type, stand-age class, and Forest Survey Unit, Michigan, 1991-2000[1/]

(In thousand acres)

Forest type	All ages	Stand-age class (years) 1-20	21-30	31-40	41-50	51-60	61-70	71-80	81+
ALL UNITS									
Red pine	171.2	--	50.1	113.4	7.7	--	--	--	--
White pine	1.7	--	--	1.7	--	--	--	--	--
White spruce	4.2	--	--	--	4.2	--	--	--	--
Oak-hickory	57.6	--	27.0	13.5	17.0	--	--	--	--
Maple-birch	2,402.2	--	120.2	118.1	273.9	759.6	744.0	386.5	--
All types	2,636.8	--	197.3	246.7	302.9	759.6	744.0	386.5	--
EASTERN UPPER PENINSULA									
Red pine	28.7	--	14.9	10.4	3.3	--	--	--	--
Oak-hickory	1.6	--	1.6	--	--	--	--	--	--
Maple-birch	458.0	--	30.1	26.5	57.0	151.4	117.5	75.6	--
All types	488.3	--	46.6	36.9	60.4	151.4	117.5	75.6	--
WESTERN UPPER PENINSULA									
Red pine	1.2	--	--	--	1.2	--	--	--	--
White pine	1.7	--	--	1.7	--	--	--	--	--
White spruce	1.6	--	--	--	1.6	--	--	--	--
Oak-hickory	1.6	--	--	1.6	--	--	--	--	--
Maple-birch	975.3	--	38.6	36.2	108.5	322.1	336.9	133.1	--
All types	981.4	--	38.6	39.5	111.3	322.1	336.9	133.1	--
NORTHERN LOWER PENINSULA									
Red pine	135.6	--	35.2	99.5	0.8	--	--	--	--
Oak-hickory	34.3	--	17.8	7.1	9.5	--	--	--	--
Maple-birch	746.1	--	21.7	26.0	69.1	242.5	256.8	129.9	--
All types	915.9	--	74.7	132.6	79.5	242.5	256.8	129.9	--
SOUTHERN LOWER PENINSULA									
Red pine	5.8	--	--	3.4	2.3	--	--	--	--
White spruce	2.6	--	--	--	2.6	--	--	--	--
Oak-hickory	20.0	--	7.6	4.9	7.5	--	--	--	--
Maple-birch	222.8	--	29.8	29.4	39.2	43.7	32.8	47.9	--
All types	251.2	--	37.4	37.7	51.7	43.7	32.8	47.9	--

[1/] Tables may not add to totals due to rounding.

Table 24.--Average annual yields from thinning by species group, tree class, and Forest Survey Unit, Michigan, 1991-2000[1/]

(In thousand cubic feet)

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
ALL UNITS						
SOFTWOODS						
Jack pine	1,710	711	999	62	22	40
Red pine	14,409	9,386	5,023	223	--	223
White pine	2,300	835	1,465	111	31	80
White spruce	1,529	981	548	--	--	--
Black spruce	175	175	--	--	--	--
Balsam fir	5,312	4,319	993	25	--	25
Hemlock	1,467	347	1,120	75	19	56
Northern white-cedar	886	669	217	28	--	28
Other softwoods	313	164	149	58	--	58
Total	28,101	17,587	10,514	582	72	510
HARDWOODS						
White oak	520	227	293	12	--	12
Select red oak	2,604	512	2,092	103	70	33
Other red oak	507	91	416	92	--	92
Hickory	199	64	135	--	--	--
Basswood	10,896	2,714	8,182	576	196	380
Beech	617	507	110	86	--	86
Yellow birch	776	658	118	16	--	16
Hard maple	44,117	33,655	10,462	1,681	253	1428
Soft maple	24,260	15,325	8,935	1,465	144	1321
Elm	6,479	2,535	3,944	159	67	92
Ash	3,974	2,226	1,748	58	32	26
Cottonwood	69	--	69	--	--	--
Balsam poplar	154	81	73	--	--	--
Bigtooth aspen	2,911	1,247	1,664	116	16	100
Quaking aspen	3,373	1,317	2,056	226	28	198
Paper birch	2,159	1,315	844	51	29	22
Black cherry	4,127	2,499	1,628	198	15	183
Other hardwoods	703	476	227	--	--	--
Total	108,445	65,449	42,996	4,839	850	3,989
All species	136,546	83,036	53,510	5,421	922	4,499
EASTERN UPPER PENINSULA						
SOFTWOODS						
Jack pine	482	202	280	8	--	8
Red pine	1,075	944	131	22	--	22
White pine	342	13	329	49	15	34
White spruce	422	149	273	--	--	--
Black spruce	54	54	--	--	--	--
Balsam fir	1,512	1,161	351	--	--	--
Hemlock	283	31	252	25	--	25
Northern white-cedar	338	301	37	10	--	10
Total	4,508	2,855	1,653	114	15	99
HARDWOODS						
Select red oak	61	12	49	14	--	14
Basswood	1,177	233	944	154	63	91
Beech	368	322	46	36	--	36
Yellow birch	86	48	38	--	--	--
Hard maple	8,005	5,008	2,997	267	49	218
Soft maple	5,810	3,754	2,056	451	29	422
Elm	1,322	120	1,202	33	14	19
Ash	277	139	138	--	--	--
Balsam poplar	35	8	27	--	--	--
Bigtooth aspen	228	137	91	10	--	10
Quaking aspen	285	97	188	--	--	--
Paper birch	305	201	104	--	--	--
Black cherry	504	276	228	88	--	88
Total	18,463	10,355	8,108	1,053	155	898
All species	22,971	13,210	9,761	1,167	170	997

(Table 24 continued on next page)

(Table 24 continued)

WESTERN UPPER PENINSULA

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
SOFTWOODS						
Jack pine	137	64	73	9	9	--
Red pine	28	28	--	--	--	--
White pine	475	68	407	16	16	--
White spruce	830	663	167	--	--	--
Black spruce	101	101	--	--	--	--
Balsam fir	3,510	2,967	543	25	--	25
Hemlock	803	165	638	50	19	31
Northern white-cedar	245	161	84	--	--	--
Total	6,129	4,217	1,912	100	44	56
HARDWOODS						
Select red oak	581	101	480	--	--	--
Basswood	5,990	1,312	4,678	400	133	267
Yellow birch	560	480	80	16	--	16
Hard maple	17,935	14,080	3,855	1033	128	905
Soft maple	8,794	5,974	2,820	375	38	337
Elm	3,130	1,063	2,067	112	53	59
Ash	758	489	269	11	--	11
Balsam poplar	73	27	46	--	--	--
Bigtooth aspen	407	204	203	9	--	9
Quaking aspen	1,304	372	932	140	28	112
Paper birch	764	378	386	11	11	--
Black cherry	865	572	293	27	15	12
Other hardwoods	61	61				
Total	41,222	25,113	16,109	2,134	406	1,728
All species	47,351	29,330	18,021	2,234	450	1,784
NORTHERN LOWER PENINSULA						
SOFTWOODS						
Jack pine	908	320	588	45	13	32
Red pine	12,714	8,160	4,554	179	--	179
White pine	1,130	630	500	23	--	23
Black spruce	20	20	--	--	--	--
Balsam fir	290	191	99	--	--	--
Hemlock	358	128	230	--	--	--
Northern white-cedar	303	207	96	18	--	18
Other softwoods	141	56	85	48	--	48
Total	15,864	9,712	6,152	313	13	300
HARDWOODS						
White oak	196	46	150	12	--	12
Select red oak	1,523	145	1,378	42	23	19
Other red oak	507	91	416	92	--	92
Hickory	36	36	--	--	--	--
Basswood	3,577	1,017	2,560	22	--	22
Beech	249	185	64	50	--	50
Yellow birch	130	130	--	--	--	--
Hard maple	17,453	13,942	3,511	381	76	305
Soft maple	7,236	4,436	2,800	545	77	468
Elm	939	532	407	14	--	14
Ash	1,652	690	962	47	32	15
Cottonwood	25	--	25	--	--	--
Balsam poplar	46	46	--	--	--	--
Bigtooth aspen	2,021	868	1,153	97	16	81
Quaking aspen	1,784	848	936	86	--	86
Paper birch	1,022	668	354	40	18	22
Black cherry	1,021	407	614	83	--	83
Other hardwoods	24	--	24	--	--	--
Total	39,441	24,087	15,354	1,511	242	1,269
All species	55,305	33,799	21,506	1,824	255	1,569

(Table 24 continued on next page)

(Table 24 continued)

SOUTHERN LOWER PENINSULA

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2]
SOFTWOODS						
Jack pine	183	125	58	--	--	--
Red pine	592	254	338	22	--	22
White pine	353	124	229	23	--	23
White spruce	277	169	108	--	--	--
Hemlock	23	23	--	--	--	--
Other softwoods	172	108	64	10	--	10
Total	1,600	803	797	55	--	55
HARDWOODS						
White oak	324	181	143	--	--	--
Select red oak	439	254	185	47	47	--
Hickory	163	28	135	--	--	--
Basswood	152	152	--	--	--	--
Hard maple	724	625	99	--	--	--
Soft maple	2,420	1,161	1,259	94	--	94
Elm	1,088	820	268	--	--	--
Ash	1,287	908	379	--	--	--
Cottonwood	44	--	44	--	--	--
Bigtooth aspen	255	38	217	--	--	--
Paper birch	68	68	--	--	--	--
Black cherry	1,737	1,244	493	--	--	--
Other hardwoods	618	415	203	--	--	--
Total	9,319	5,894	3,425	141	47	94
All species	10,919	6,697	4,222	196	47	149

[1] Tables may not add to totals due to rounding.
[2] Rough and rotten cull.

Table 25.--Average annual yields of growing-stock from thinning by species group, forest type, and Forest Survey Unit, Michigan, 1991-2000[1/]

(In thousand cubic feet)

Species group	Total	Red pine	White pine	White spruce	Balsam fir	Oak-hickory	Maple-birch
			ALL UNITS				
			Forest type[2/]				
SOFTWOODS							
Jack pine	1,710	1,324	--	--	--	174	212
Red pine	14,409	13,167	--	--	--	308	934
White pine	2,300	406	56	--	--	--	1,838
White spruce	1,529	--	75	408	--	--	1,046
Black spruce	175	--	--	--	--	--	175
Balsam fir	5,312	--	--	--	--	--	5,312
Hemlock	1,467	--	--	--	--	--	1,467
Northern white-cedar	886	39	--	--	--	--	847
Other softwoods	313	185	--	--	--	--	128
Total	28,101	15,121	131	408	--	482	11,959
HARDWOODS							
White oak	520	90	--	--	--	116	314
Select red oak	2,604	462	--	--	--	281	1,861
Other red oak	507	384	--	--	--	123	--
Hickory	199	--	--	--	--	--	199
Basswood	10,896	--	--	--	--	--	10,896
Beech	617	--	--	--	--	--	617
Yellow birch	776	--	--	--	--	--	776
Hard maple	44,117	14	--	--	--	--	44,103
Soft maple	24,260	397	--	--	--	306	23,557
Elm	6,479	--	--	--	--	--	6,479
Ash	3,974	--	--	--	--	--	3,974
Cottonwood	69	--	--	--	--	--	69
Balsam poplar	154	--	--	--	--	--	154
Bigtooth aspen	2,911	286	--	--	--	371	2,254
Quaking aspen	3,373	173	--	--	--	99	3,101
Paper birch	2,159	28	--	--	--	--	2,131
Black cherry	4,127	96	--	--	--	62	3,969
Other hardwoods	703	--	--	--	--	--	703
Total	108,445	1,930	--	--	--	1,358	105,157
All species	136,546	17,051	131	408	--	1,840	117,116
			EASTERN UPPER PENINSULA				
SOFTWOODS							
Jack pine	482	482	--	--	--	--	--
Red pine	1,075	1,075	--	--	--	--	--
White pine	342	13	--	--	--	--	329
White spruce	422	--	--	--	--	--	422
Black spruce	54	--	--	--	--	--	54
Balsam fir	1,512	--	--	--	--	--	1,512
Hemlock	283	--	--	--	--	--	283
Northern white-cedar	338	--	--	--	--	--	338
Total	4,508	1,570	--	--	--	--	2,938
HARDWOODS							
Select red oak	61	--	--	--	--	--	61
Basswood	1,177	--	--	--	--	--	1,177
Beech	368	--	--	--	--	--	368
Yellow birch	86	--	--	--	--	--	86
Hard maple	8,005	--	--	--	--	--	8,005
Soft maple	5,810	115	--	--	--	172	5,523
Elm	1,322	--	--	--	--	--	1,322
Ash	277	--	--	--	--	--	277
Balsam poplar	35	--	--	--	--	--	35
Bigtooth aspen	228	12	--	--	--	--	216
Quaking aspen	285	17	--	--	--	--	268
Paper birch	305	--	--	--	--	--	305
Black cherry	504	--	--	--	--	--	504
Total	18,463	144	--	--	--	172	18,147
All species	22,971	1,714	--	--	--	172	21,085

(Table 25 continued on next page)

(Table 25 continued)

WESTERN UPPER PENINSULA

Species group	Total	Forest type[2/] Red pine	White pine	White spruce	Balsam fir	Oak-hickory	Maple-birch
SOFTWOODS							
Jack pine	137	22	--	--	--	--	115
Red pine	28	--	--	--	--	--	28
White pine	475	--	56	--	--	--	419
White spruce	830	--	75	131	--	--	624
Black spruce	101	--	--	--	--	--	101
Balsam fir	3,510	--	--	--	--	--	3,510
Hemlock	803	--	--	--	--	--	803
Northern white-cedar	245	--	--	--	--	--	245
Total	6,129	22	131	131	--	--	5,845
HARDWOODS							
Select red oak	581	--	--	--	--	--	581
Basswood	5,990	--	--	--	--	--	5,990
Yellow birch	560	--	--	--	--	--	560
Hard maple	17,935	--	--	--	--	--	17,935
Soft maple	8,794	--	--	--	--	--	8,794
Elm	3,130	--	--	--	--	--	3,130
Ash	758	--	--	--	--	--	758
Balsam poplar	73	--	--	--	--	--	73
Bigtooth aspen	407	--	--	--	--	37	370
Quaking aspen	1,304	34	--	--	--	--	1,270
Paper birch	764	28	--	--	--	--	736
Black cherry	865	--	--	--	--	--	865
Other hardwoods	61	--	--	--	--	--	61
Total	41,222	62	--	--	--	37	41,123
All species	47,351	84	131	131	--	37	46,968

NORTHERN LOWER PENINSULA

Species group	Total	Red pine	White pine	White spruce	Balsam fir	Oak-hickory	Maple-birch
SOFTWOODS							
Jack pine	908	637	--	--	--	174	97
Red pine	12,714	11,759	--	--	--	308	647
White pine	1,130	393	--	--	--	--	737
Black spruce	20	--	--	--	--	--	20
Balsam fir	290	--	--	--	--	--	290
Hemlock	358	--	--	--	--	--	358
Northern white-cedar	303	39	--	--	--	--	264
Other softwoods	141	94	--	--	--	--	47
Total	15,864	12,922	--	--	--	482	2,460
HARDWOODS							
White oak	196	90	--	--	--	35	71
Select red oak	1,523	462	--	--	--	160	901
Other red oak	507	384	--	--	--	123	--
Hickory	36	--	--	--	--	--	36
Basswood	3,577	--	--	--	--	--	3,577
Beech	249	--	--	--	--	--	249
Yellow birch	130	--	--	--	--	--	130
Hard maple	17,453	14	--	--	--	--	17,439
Soft maple	7,236	282	--	--	--	116	6,838
Elm	939	--	--	--	--	--	939
Ash	1,652	--	--	--	--	--	1,652
Cottonwood	25	--	--	--	--	--	25
Balsam poplar	46	--	--	--	--	--	46
Bigtooth aspen	2,021	274	--	--	--	192	1,555
Quaking aspen	1,784	122	--	--	--	99	1,563
Paper birch	1,022	--	--	--	--	--	1,022
Black cherry	1,021	96	--	--	--	--	925
Other hardwoods	24	--	--	--	--	--	24
Total	39,441	1,724	--	--	--	725	36,992
All species	55,305	14,646	--	--	--	1,207	39,452

(Table 25 continued on next page)

(Table 25 continued)

SOUTHERN LOWER PENINSULA

Species group	Total	Forest type[2/]					
		Red pine	White pine	White spruce	Balsam fir	Oak-hickory	Maple-birch
SOFTWOODS							
Jack pine	183	183	--	--	--	--	--
Red pine	592	333	--	--	--	--	259
White pine	353	--	--	--	--	--	353
White spruce	277	--	--	277	--	--	--
Hemlock	23	--	--	--	--	--	23
Other softwoods	172	91	--	--	--	--	81
Total	1,600	607	--	277	--	--	716
HARDWOODS							
White oak	324	--	--	--	--	81	243
Select red oak	439	--	--	--	--	121	318
Hickory	163	--	--	--	--	--	163
Basswood	152	--	--	--	--	--	152
Hard maple	724	--	--	--	--	--	724
Soft maple	2,420	--	--	--	--	18	2,402
Elm	1,088	--	--	--	--	--	1,088
Ash	1,287	--	--	--	--	--	1,287
Cottonwood	44	--	--	--	--	--	44
Bigtooth aspen	255	--	--	--	--	142	113
Paper birch	68	--	--	--	--	--	68
Black cherry	1,737	--	--	--	--	62	1,675
Other hardwoods	618	--	--	--	--	--	618
Total	9,319	--	--	--	--	424	8,895
All species	10,919	607	--	277	--	424	9,611

[1/] Tables may not add to totals due to rounding.
[2/] Thinning was a treatment option only in the forest types shown below.

Table 26.--Average annual yields of growing stock from thinning by forest type, stand-age class, and Forest Survey Unit, Michigan, 1991-2000[1/]

(In thousand cubic feet)

Forest type	All ages	Stand-age class (years) 1-20	21-30	31-40	41-50	51-60	61-70	71-80	81+
ALL UNITS									
Red pine	17,051	--	3,579	12,851	621	--	--	--	--
White pine	131	--	--	131	--	--	--	--	--
White spruce	408	--	--	--	408	--	--	--	--
Oak-hickory	1,840	--	1,027	325	488	--	--	--	--
Maple-birch	117,116	--	4,871	6,115	14,945	38,842	35,669	16,674	--
All types	136,546	--	9,477	19,422	16,462	38,842	35,669	16,674	--
EASTERN UPPER PENINSULA									
Red pine	1,714	--	278	1,192	244	--	--	--	--
Oak-hickory	172	--	172	--	--	--	--	--	--
Maple-birch	21,085	--	1,433	1,132	3,113	7,001	5,675	2,731	--
All types	22,971	--	1,883	2,324	3,357	7,001	5,675	2,731	--
WESTERN UPPER PENINSULA									
Red pine	84	--	--	--	84	--	--	--	--
White pine	131	--	--	131	--	--	--	--	--
White spruce	131	--	--	--	131	--	--	--	--
Oak-hickory	37	--	--	37	--	--	--	--	--
Maple-birch	46,968	--	1,601	1,820	5,665	15,837	16,207	5,838	--
All types	47,351	--	1,601	1,988	5,880	15,837	16,207	5,838	--
NORTHERN LOWER PENINSULA									
Red pine	14,646	--	3,301	11,269	76	--	--	--	--
Oak-hickory	1,207	--	654	207	346	--	--	--	--
Maple-birch	39,452	--	1,090	1,446	3,957	13,968	12,675	6,316	--
All types	55,305	--	5,045	12,922	4,379	13,968	12,675	6,316	--
SOUTHERN LOWER PENINSULA									
Red pine	607	--	--	390	217	--	--	--	--
White spruce	277	--	--	--	277	--	--	--	--
Oak-hickory	424	--	201	81	142	--	--	--	--
Maple-birch	9,611	--	747	1,717	2,210	2,036	1,112	1,789	--
All types	10,919	--	948	2,188	2,846	2,036	1,112	1,789	--

[1/] Tables may not add to totals due to rounding.

Table 27.--Commercial forest area qualifying for timber stand improvement by forest type, stand-age class, and Forest Survey Unit, Michigan,1991-2000[1/]

(In thousand acres)

ALL UNITS

Forest type	All ages	Stand-age class (years) 1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81+
Jack pine	22.7	--	7.1	13.6	2.0	--	--	--	--	--
White pine	14.2	--	5.8	8.4	--	--	--	--	--	--
White spruce	7.5	--	--	7.5	--	--	--	--	--	--
Balsam fir	7.3	--	1.6	--	5.7	--	--	--	--	--
Northern white-cedar	45.0	--	--	--	--	45.0	--	--	--	--
Oak-hickory	24.2	--	--	19.3	2.3	2.7	--	--	--	--
Maple-birch	327.8	--	--	86.7	46.1	44.2	58.6	62.1	30.0	--
All types	448.6	--	14.5	135.5	56.1	91.9	58.6	62.1	30.0	--
EASTERN UPPER PENINSULA										
White pine	5.3	--	3.6	1.7	--	--	--	--	--	--
White spruce	3.2	--	--	3.2	--	--	--	--	--	--
Balsam fir	1.5	--	--	--	1.5	--	--	--	--	--
Northern white-cedar	34.5	--	--	--	--	34.5	--	--	--	--
Maple-birch	65.2	--	--	16.4	10.1	13.0	9.2	10.4	6.1	--
All types	109.6	--	3.6	21.2	11.7	47.5	9.2	10.4	6.1	--
WESTERN UPPER PENINSULA										
White spruce	1.6	--	--	1.6	--	--	--	--	--	--
Balsam fir	5.8	--	1.6	--	4.2	--	--	--	--	--
Northern white-cedar	1.4	--	--	--	--	1.4	--	--	--	--
Maple-birch	115.1	--	--	24.2	12.6	13.5	28.3	30.0	6.4	--
All types	123.9	--	1.6	25.9	16.8	14.9	28.3	30.0	6.4	--
NORTHERN LOWER PENINSULA										
Jack pine	22.7	--	7.1	13.6	2.0	--	--	--	--	--
White pine	8.9	--	2.2	6.7	--	--	--	--	--	--
White spruce	2.7	--	--	2.7	--	--	--	--	--	--
Northern white-cedar	9.1	--	--	--	--	9.1	--	--	--	--
Oak-hickory	12.1	--	--	7.2	2.3	2.7	--	--	--	--
Maple-birch	81.7	--	--	19.2	16.6	11.4	9.5	21.7	3.3	--
All types	137.2	--	9.2	49.4	20.9	23.2	9.5	21.7	3.3	--
SOUTHERN LOWER PENINSULA										
Oak-hickory	12.1	--	--	12.1	--	--	--	--	--	--
Maple-birch	65.8	--	--	26.9	6.8	6.3	11.6	--	14.2	--
All types	77.9	--	--	39.0	6.8	6.3	11.6	--	14.2	--

[1/]Tables may not add to totals due to rounding.

Table 28.--Average annual yields from timber stand improvement by species group, tree class, and Forest Survey Unit, Michigan, 1991-2000[1/]

(In thousand cubic feet)

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
ALL UNITS						
SOFTWOODS						
Jack pine	21	--	21	--	--	--
White pine	54	--	54	--	--	--
White spruce	421	--	421	--	--	--
Balsam fir	610	505	105	--	--	--
Total	1,106	505	601	--	--	--
HARDWOODS						
White oak	42	--	42	--	--	--
Yellow birch	14	--	14	--	--	--
Hard maple	93	19	74	--	--	--
Soft maple	283	158	125	31	14	17
Elm	45	--	45	--	--	--
Balsam poplar	122	56	66	10	--	10
Quaking aspen	289	157	132	34	--	34
Paper birch	21	--	21	--	--	--
Total	909	390	519	75	14	61
All species	2,015	895	1,120	75	14	61
EASTERN UPPER PENINSULA						
SOFTWOODS						
White spruce	74	--	74	--	--	--
Balsam fir	513	467	46	--	--	--
Total	587	467	120	--	--	--
HARDWOODS						
Soft maple	178	158	20	31	14	17
Balsam poplar	93	56	37	10	--	10
Quaking aspen	164	82	82	--	--	--
Total	435	296	139	41	14	27
All species	1,022	763	259	41	14	27
WESTERN UPPER PENINSULA						
SOFTWOODS						
White spruce	129	--	129	--	--	--
Balsam fir	45	--	45	--	--	--
Total	174	--	174	--	--	--
HARDWOODS						
Yellow birch	14	--	14	--	--	--
Hard maple	93	19	74	--	--	--
Elm	45	--	45	--	--	--
Quaking aspen	34	--	34	13	--	13
Paper birch	21	--	21	--	--	--
Total	207	19	188	13	--	13
All species	381	19	362	13	--	13
NORTHERN LOWER PENINSULA						
SOFTWOODS						
Jack pine	21	--	21	--	--	--
White pine	54	--	54	--	--	--
White spruce	218	--	218	--	--	--
Balsam fir	52	38	14	--	--	--
Total	345	38	307	--	--	--
HARDWOODS						
White oak	42	--	42	--	--	--
Soft maple	105	--	105	--	--	--
Balsam poplar	29	--	29	--	--	--
Quaking aspen	91	75	16	21	--	21
Total	267	75	192	21	--	21
All species	612	113	499	21	--	21
SOUTHERN LOWER PENINSULA						
SOFTWOODS						
Total	--	--	--	--	--	--
HARDWOODS						
Total	--	--	--	--	--	--
All species	--	--	--	--	--	--

[1/] Tables may not add to totals due to rounding.
[2/] Rough and rotten cull.

Table 29.--Average annual yields of growing stock from timber stand improvement by species group, forest type, and Forest Survey Unit, Michigan, 1991-2000[1/]

(In thousand cubic feet)

ALL UNITS

Species group	All types	Forest type[2/] Jack pine	Red pine	White pine	White spruce	Balsam fir	Northern white-cedar	Oak hickory	Maple-birch
SOFTWOODS									
Jack pine	21	21	--	--	--	--	--	--	--
White pine	54	--	--	54	--	--	--	--	--
White spruce	421	--	--	34	302	85	--	--	--
Balsam fir	610	--	--	21	--	45	544	--	--
Total	1,106	21	--	109	302	130	544	--	--
HARDWOODS									
White oak	42	--	--	42	--	--	--	--	--
Yellow birch	14	--	--	--	14	--	--	--	--
Hard maple	93	--	--	--	93	--	--	--	--
Soft maple	283	--	--	283	--	--	--	--	--
Elm	45	--	--	--	45	--	--	--	--
Balsam poplar	122	--	--	--	--	54	68	--	--
Quaking aspen	289	--	--	59	--	34	196	--	--
Paper birch	21	--	--	--	--	21	--	--	--
Total	909	--	--	384	152	109	264	--	--
All species	2,015	21	--	493	454	239	808	--	--
EASTERN UPPER PENINSULA									
SOFTWOODS									
White spruce	74	--	--	34	40	--	--	--	--
Balsam fir	513	--	--	21	--	--	492	--	--
Total	587	--	--	55	40	--	492	--	--
HARDWOODS									
Soft maple	178	--	--	178	--	--	--	--	--
Balsam poplar	93	--	--	--	--	54	39	--	--
Quaking aspen	164	--	--	--	--	--	164	--	--
Total	435	--	--	178	--	54	203	--	--
All species	1,022	--	--	233	40	54	695	--	--
WESTERN UPPER PENINSULA									
SOFTWOODS									
White spruce	129	--	--	--	44	85	--	--	--
Balsam fir	45	--	--	--	--	45	--	--	--
Total	174	--	--	--	44	130	--	--	--
HARDWOODS									
Yellow birch	14	--	--	--	14	--	--	--	--
Hard maple	93	--	--	--	93	--	--	--	--
Elm	45	--	--	--	45	--	--	--	--
Quaking aspen	34	--	--	--	--	34	--	--	--
Paper birch	21	--	--	--	--	21	--	--	--
Total	207	--	--	--	152	55	--	--	--
All species	381	--	--	--	196	185	--	--	--

(Table 29 continued on next page)

(Table 29 continued)

Species group	All types	Jack pine	Red pine	White pine	White spruce	Balsam fir	Northern white-cedar	Oak hickory	Maple-birch
				NORTHERN LOWER PENINSULA					
				Forest type[2/]					
SOFTWOODS									
Jack pine	21	21	--	--	--	--	--	--	--
White pine	54	--	--	54	--	--	--	--	--
White spruce	218	--	--	--	218	--	--	--	--
Balsam fir	52	--	--	--	--	--	52	--	--
Total	345	21	--	54	218	--	52	--	--
HARDWOODS									
White oak	42	--	--	42	--	--	--	--	--
Soft maple	105	--	--	105	--	--	--	--	--
Balsam poplar	29	--	--	--	--	--	29	--	--
Quaking aspen	91	--	--	59	--	--	32	--	--
Total	267	--	--	206	--	--	61	--	--
All species	612	21	--	260	218	--	113	--	--
				SOUTHERN LOWER PENINSULA					
SOFTWOODS									
Total	--	--	--	--	--	--	--	--	--
HARDWOODS									
Total	--	--	--	--	--	--	--	--	--
All species	--	--	--	--	--	--	--	--	--

[1/] Tables may not add to totals due to rounding.
[2/] Timber stand improvelment was a treatment option only in the forest types shown below.

Table 30.--Average annual yields of growing stock from timber stand improvement by forest type, stand-age class, and Forest Survey Unit, Michigan, 1991-2000[1/]

(In thousand cubic feet)

Forest type	All ages	Stand-age class (years) 1-10	11-20	21-30	31-40	41-50	51+
ALL UNITS							
Jack pine	21	--	--	--	21	--	--
White pine	493	--	258	235	--	--	--
White spruce	454	--	--	454	--	--	--
Balsam fir	239	--	185	--	54	--	--
Northern white-cedar	808	--	--	--	--	808	--
All types	2,015	--	443	689	75	808	--
EASTERN UPPER PENINSULA							
White pine	233	--	199	34	--	--	--
White spruce	40	--	--	40	--	--	--
Balsam fir	54	--	--	--	54	--	--
Northern white-cedar	695	--	--	--	--	695	--
All types	1,022	--	199	74	54	695	--
WESTERN UPPER PENINSULA							
White spruce	196	--	--	196	--	--	--
Balsam fir	185	--	185	--	--	--	--
All types	381	--	185	196	--	--	--
NORTHERN LOWER PENINSULA							
Jack pine	21	--	--	--	21	--	--
White pine	260	--	59	201	--	--	--
White spruce	218	--	--	218	--	--	--
Northern white-cedar	113	--	--	--	--	113	--
All types	612	--	59	419	21	113	--
SOUTHERN LOWER PENINSULA							
All types	--	--	--	--	--	--	--

[1/] Tables may not add to totals due to rounding.

Table 31.--Commercial forest area qualifying for treatment and average annual yields of growing stock from each treatment by treatment category and Forest Survey Unit, Michigan, 2001-2010[1/]

Treatment	All units	Forest Survey Unit: Eastern Upper Peninsula	Western Upper Peninsula	Northern Lower Peninsula	Southern Lower Peninsula
COMMERCIAL FOREST AREA					
		In thousand acres			
Harvest	2,517.6	547.7	636.2	1,043.4	290.3
Thinning	2,600.7	449.9	930.1	872.9	347.8
Timber stand improvement	316.6	100.3	90.9	76.8	48.6
No treatment	11,784.9	2,611.0	2,773.2	4,706.0	1,694.7
Total	17,219.8	3,708.9	4,430.4	6,699.1	2,381.4
AVERAGE ANNUAL YIELDS OF GROWING STOCK					
		In thousand cubic feet			
Harvest	576,389	126,521	162,588	218,215	69,065
Thinning	160,570	26,704	53,788	58,763	21,315
Timber stand improvement	3,307	1,344	326	1,637	--
Total	740,266	154,569	216,702	278,615	90,380

[1/] Tables may not add to totals due to rounding.

Table 32.--Commercial forest area qualifying for harvest by forest type, stand-age class, and Forest Survey Unit, Michigan, 2001-2010[1/]

(In thousand acres)

ALL UNITS

Forest type	All ages	Stand-age class (years)										
		1-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	148.5	--	--	--	80.7	58.5	9.3	--	--	--	--	--
Red pine	111.1	--	--	58.9	47.0	2.4	1.7	1.1	--	--	--	--
White pine	25.9	--	--	--	--	--	--	2.3	4.0	19.7	--	--
White spruce	12.6	--	--	--	1.0	1.5	7.4	1.2	--	1.5	--	--
Black spruce	65.4	--	--	--	33.0	7.7	24.7	--	--	--	--	--
Balsam fir	108.7	--	--	--	--	61.7	41.3	4.9	0.8	--	--	--
Tamarack	13.4	--	--	--	1.2	3.3	8.9	--	--	--	--	--
Northern white-cedar	148.1	--	--	--	--	--	--	--	5.6	124.1	18.3	--
Oak-hickory	224.0	--	--	--	--	--	1.3	123.6	35.8	61.6	1.7	--
Elm-ash-maple	147.0	--	--	--	--	--	21.2	55.6	46.5	22.5	1.2	--
Maple-birch	680.9	--	--	--	--	--	--	161.5	108.3	367.7	43.4	--
Aspen	750.7	--	279.5	117.4	264.9	89.0	--	--	--	--	--	--
Paper birch	67.8	--	0.1	--	1.0	1.9	62.9	1.9	--	--	--	--
Exotic	13.5	--	--	13.5	--	--	--	--	--	--	--	--
All types	2,517.6	--	279.6	189.8	428.8	226.0	178.7	352.0	200.9	597.1	64.7	--

EASTERN UPPER PENINSULA

Jack pine	36.3	--	--	--	3.0	33.3	--	--	--	--	--	--
Red pine	25.5	--	--	5.3	20.2	--	--	--	--	--	--	--
White pine	8.5	--	--	--	--	--	--	--	4.0	4.5	--	--
White spruce	3.6	--	--	--	--	--	2.3	1.2	--	--	--	--
Black spruce	34.8	--	--	--	33.0	1.8	--	--	--	--	--	--
Balsam fir	36.1	--	--	--	--	36.1	--	--	--	--	--	--
Tamarack	5.3	--	--	--	--	--	5.3	--	--	--	--	--
Northern white-cedar	77.4	--	--	--	--	--	--	--	4.7	72.7	--	--
Oak-hickory	2.5	--	--	--	--	--	1.3	1.1	--	--	--	--
Elm-ash-maple	20.7	--	--	--	--	--	--	3.0	14.0	3.8	--	--
Maple-birch	125.5	--	--	--	--	--	--	--	--	125.5	--	--
Aspen	149.5	--	14.7	24.5	107.5	2.9	--	--	--	--	--	--
Paper birch	21.5	--	--	--	--	1.9	19.6	--	--	--	--	--
Exotic	0.4	--	--	0.4	--	--	--	--	--	--	--	--
All types	547.7	--	14.7	30.2	163.8	76.0	28.6	5.3	22.6	206.5	--	--

(Table 32 continued on next page)

(Table 32 continued)

Forest type	All ages	Stand-age class (years) 1-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
WESTERN UPPER PENINSULA												
Jack pine	14.3	--	--	--	--	5.0	9.3	--	--	--	--	--
Red pine	9.5	--	--	--	6.6	--	1.7	1.1	--	--	--	--
White pine	5.0	--	--	--	--	--	--	--	--	5.0	--	--
White spruce	6.5	--	--	--	--	1.5	5.1	--	--	--	--	--
Black spruce	27.5	--	--	--	--	3.6	23.9	--	--	--	--	--
Balsam fir	66.9	--	--	--	--	25.6	41.3	--	--	--	--	--
Tamarack	5.0	--	--	--	0.3	3.3	1.5	--	--	--	--	--
Northern white-cedar	25.0	--	--	--	--	--	--	--	--	6.7	18.3	--
Oak-hickory	1.9	--	--	--	--	--	--	--	--	0.2	1.7	--
Elm-ash-maple	19.9	--	--	--	--	--	--	--	--	18.7	1.2	--
Maple-birch	270.8	--	--	--	--	--	--	--	--	227.3	43.4	--
Aspen	155.9	--	--	--	69.8	86.1	--	--	--	--	--	--
Paper birch	27.9	--	--	--	--	--	27.9	--	--	--	--	--
All types	636.2	--	--	--	76.7	125.1	110.6	1.1	--	258.0	64.7	--
NORTHERN LOWER PENINSULA												
Jack pine	95.5	--	--	--	77.7	17.8	--	--	--	--	--	--
Red pine	71.7	--	--	53.6	18.1	--	--	--	--	--	--	--
White pine	10.2	--	--	--	--	--	--	--	--	10.2	--	--
White spruce	1.5	--	--	--	--	--	--	--	--	1.5	--	--
Black spruce	3.1	--	--	--	--	2.3	0.8	--	--	--	--	--
Balsam fir	5.6	--	--	--	--	--	--	4.9	0.8	--	--	--
Tamarack	3.1	--	--	--	1.0	--	2.1	--	--	--	--	--
Northern white-cedar	44.6	--	--	--	--	--	--	--	--	44.6	--	--
Oak-hickory	134.2	--	--	--	--	--	--	122.5	11.7	--	--	--
Elm-ash-maple	41.1	--	--	--	--	--	--	21.4	19.7	--	--	--
Maple-birch	193.2	--	--	--	--	--	--	139.1	54.1	--	--	--
Aspen	414.1	--	257.1	78.9	78.1	--	--	--	--	--	--	--
Paper birch	17.3	--	--	--	--	--	15.4	1.9	--	--	--	--
Exotic	8.2	--	--	8.2	--	--	--	--	--	--	--	--
All types	1,043.4	--	257.1	140.8	174.8	20.1	18.4	289.7	86.3	56.4	--	--
SOUTHERN LOWER PENINSULA												
Jack pine	2.4	--	--	--	--	2.4	--	--	--	--	--	--
Red pine	4.4	--	--	--	2.0	2.4	--	--	--	--	--	--
White pine	2.3	--	--	--	--	--	--	2.3	--	--	--	--
White spruce	1.0	--	--	--	1.0	--	--	--	--	--	--	--
Northern white-cedar	1.0	--	--	--	--	--	--	--	1.0	--	--	--
Oak-hickory	85.4	--	--	--	--	--	--	--	24.0	61.4	--	--
Elm-ash-maple	65.3	--	--	--	--	--	21.2	31.2	12.8	--	--	--
Maple-birch	91.4	--	--	--	--	--	--	22.4	54.1	14.9	--	--
Aspen	31.2	--	7.7	13.9	9.6	--	--	--	--	--	--	--
Paper birch	1.0	--	0.1	--	1.0	--	--	--	--	--	--	--
Exotic	4.9	--	--	4.9	--	--	--	--	--	--	--	--
All types	290.3	--	7.8	18.9	13.5	4.8	21.2	55.9	92.0	76.3	--	--

1/ Tables may not add to totals due to rounding.

Table 33.--Average annual yields from harvest by species group, tree class, and Forest Survey Unit, Michigan, 2001-2010[1/]

(In thousand cubic feet)

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
ALL UNITS						
SOFTWOODS						
Jack pine	23,160	4,885	18,275	804	86	718
Red pine	39,921	2,609	37,312	68	17	51
White pine	19,795	1,228	18,567	304	126	178
White spruce	27,078	1,883	25,195	227	36	191
Black spruce	10,817	8,625	2,192	36	--	36
Balsam fir	28,966	12,953	16,013	579	21	558
Hemlock	11,519	860	10,659	581	210	371
Tamarack	907	522	385	33	--	33
Northern white-cedar	37,270	13,821	23,449	2,943	479	2,464
Other softwoods	2,546	1,571	975	301	29	272
Total	201,979	48,957	153,022	5,876	1,004	4,872
HARDWOODS						
White oak	12,910	1,917	10,993	237	24	213
Select red oak	31,890	2,971	28,919	1,183	354	829
Other red oak	7,080	596	6,484	328	23	305
Hickory	2,376	265	2,111	40	40	--
Basswood	18,245	748	17,497	940	113	827
Beech	7,385	1,255	6,130	939	98	841
Yellow birch	8,025	1,114	6,911	1,236	293	943
Hard maple	66,208	14,494	51,714	4,509	1,083	3,426
Soft maple	67,891	14,631	53,260	4,733	622	4,111
Elm	8,384	1,412	6,972	370	36	334
Ash	14,547	4,715	9,832	420	66	354
Cottonwood	949	--	949	--	--	--
Balsam poplar	6,039	757	5,282	186	30	156
Bigtooth aspen	26,844	10,021	16,823	994	73	921
Quaking aspen	58,942	12,537	46,405	4,049	283	3,766
Paper birch	23,871	6,850	17,021	1,237	50	1,187
Black cherry	9,826	1,784	8,042	785	30	755
Other hardwoods	2,998	758	2,240	224	16	208
Total	374,410	76,825	297,585	22,410	3,234	19,176
All species	576,389	125,782	450,607	28,286	4,238	24,048
EASTERN UPPER PENINSULA						
SOFTWOODS						
Jack pine	6,107	1,776	4,331	242	2	240
Red pine	7,385	367	7,018	17	17	--
White pine	4,286	306	3,980	143	76	67
White spruce	13,141	514	12,627	191	--	191
Black spruce	5,855	5,138	717	6	--	6
Balsam fir	9,248	4,821	4,427	216	9	207
Hemlock	2,290	226	2,064	58	20	38
Tamarack	328	160	168	11	--	11
Northern white-cedar	15,716	6,369	9,347	1,172	219	953
Other softwoods	55	16	39	--	--	--
Total	64,411	19,693	44,718	2,056	343	1,713
HARDWOODS						
White oak	14	--	14	--	--	--
Select red oak	694	65	629	70	13	57
Basswood	1,301	111	1,190	53	--	53
Beech	3,364	618	2,746	540	51	489
Yellow birch	1,211	133	1,078	96	31	65
Hard maple	13,565	2,737	10,828	896	303	593
Soft maple	12,265	2,464	9,801	1,366	122	1,244
Elm	1,574	78	1,496	117	--	117
Ash	976	490	486	48	11	37
Balsam poplar	2,918	272	2,646	36	--	36
Bigtooth aspen	2,317	99	2,218	38	--	38
Quaking aspen	13,583	2,799	10,784	1,044	30	1,014
Paper birch	7,860	2,708	5,152	219	8	211
Black cherry	468	--	468	145	--	145
Total	62,110	12,574	49,536	4,668	569	4,099
All species	126,521	32,267	94,254	6,724	912	5,812

(Table 33 continued on next page)

(Table 33 continued)

Species group	Tree class: Growing stock: Total	Growing stock: Pole-timber	Growing stock: Saw-timber	Cull: Total	Cull: Shortlog	Cull: Other 2/
WESTERN UPPER PENINSULA						
SOFTWOODS						
Jack pine	3,212	293	2,919	83	49	34
Red pine	4,400	322	4,078	9	--	9
White pine	4,516	86	4,430	37	27	10
White spruce	11,210	869	10,341	36	36	--
Black spruce	4,496	3,232	1,264	30	--	30
Balsam fir	16,610	7,127	9,483	303	12	291
Hemlock	7,829	447	7,382	494	190	304
Tamarack	363	211	152	4	--	4
Northern white-cedar	7,655	1,482	6,173	1,030	208	822
Other softwoods	19	19	--	--	--	--
Total	60,310	14,088	46,222	2,026	522	1,504
HARDWOODS						
Select red oak	2,131	252	1,879	73	47	26
Basswood	4,971	185	4,786	595	80	515
Yellow birch	5,768	807	4,961	930	232	698
Hard maple	32,695	7,269	25,426	3,156	711	2,445
Soft maple	17,324	5,254	12,070	1,895	296	1,599
Elm	3,765	389	3,376	156	36	120
Ash	2,279	653	1,626	103	11	92
Balsam poplar	600	81	519	23	15	8
Bigtooth aspen	2,266	273	1,993	292	44	248
Quaking aspen	19,634	2,222	17,412	1,490	193	1,297
Paper birch	9,231	2,585	6,646	829	42	787
Black cherry	1,594	340	1,254	140	30	110
Other hardwoods	20	--	20	67	16	51
Total	102,278	20,310	81,968	9,749	1,753	7,996
All species	162,588	34,398	128,190	11,775	2,275	9,500
NORTHERN LOWER PENINSULA						
SOFTWOODS						
Jack pine	12,969	2,658	10,311	479	35	444
Red pine	26,453	1,736	24,717	--	--	--
White pine	8,225	739	7,486	57	--	57
White spruce	2,522	346	2,176	--	--	--
Black spruce	466	255	211	--	--	--
Balsam fir	3,108	1,005	2,103	60	--	60
Hemlock	1,302	169	1,133	29	--	29
Tamarack	188	123	65	18	--	18
Northern white-cedar	13,817	5,959	7,858	741	52	689
Other softwoods	1,564	1,117	447	178	--	178
Total	70,614	14,107	56,507	1,562	87	1,475
HARDWOODS						
White oak	6,413	1,676	4,737	205	24	181
Select red oak	21,718	2,248	19,470	825	228	597
Other red oak	4,230	365	3,865	214	23	191
Hickory	112	30	82	--	--	--
Basswood	8,718	224	8,494	184	23	161
Beech	2,637	370	2,267	173	47	126
Yellow birch	738	174	564	97	--	97
Hard maple	15,611	3,880	11,731	428	69	359
Soft maple	24,107	4,614	19,493	787	141	646
Elm	730	237	493	58	--	58
Ash	5,655	1,657	3,998	182	9	173
Cottonwood	317	--	317	--	--	--
Balsam poplar	2,090	404	1,686	127	15	112
Bigtooth aspen	21,296	9,500	11,796	664	29	635
Quaking aspen	23,332	7,301	16,031	1,366	60	1,306
Paper birch	6015	1433	4582	189	--	189
Black cherry	3,571	1,082	2,489	296	--	296
Other hardwoods	311	14	297	--	--	--
Total	147,601	35,209	112,392	5,795	668	5,127
All species	218,215	49,316	168,899	7,357	755	6,602

(Table 33 continued on next page)

(Table 33 continued)

SOUTHERN LOWER PENINSULA

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
SOFTWOODS						
Jack pine	872	158	714	--	--	--
Red pine	1,683	184	1,499	42	--	42
White pine	2,768	97	2,671	67	23	44
White spruce	205	154	51	--	--	--
Hemlock	98	18	80	--	--	--
Tamarack	28	28	--	--	--	--
Northern white-cedar	82	11	71	--	--	--
Other softwoods	908	419	489	123	29	94
Total	6,644	1,069	5,575	232	52	180
HARDWOODS						
White oak	6,483	241	6,242	32	--	32
Select red oak	7,347	406	6,941	215	66	149
Other red oak	2,850	231	2,619	114	--	114
Hickory	2,264	235	2,029	40	40	--
Basswood	3,255	228	3,027	108	10	98
Beech	1,384	267	1,117	226	--	226
Yellow birch	308	--	308	113	30	83
Hard maple	4,337	608	3,729	29	--	29
Soft maple	14,195	2,299	11,896	685	63	622
Elm	2,315	708	1,607	39	--	39
Ash	5,637	1,915	3,722	87	35	52
Cottonwood	632	--	632	--	--	--
Balsam poplar	431	--	431	--	--	--
Bigtooth aspen	965	149	816	--	--	--
Quaking aspen	2,393	215	2,178	149	--	149
Paper birch	765	124	641	--	--	--
Black cherry	4,193	362	3,831	204	--	204
Other hardwoods	2,667	744	1,923	157	--	157
Total	62,421	8,732	53,689	2,198	244	1,954
All species	69,065	9,801	59,264	2,430	296	2,134

[1/] Tables may not add to totals due to rounding.
[2/] Rough and rotten cull.

Table 34.--Average annual yields of growing stock from harvest by species group, forest type, and Forest Survey Unit, Michigan, 2001-2010[1/]

(In thousand cubic feet)

ALL UNITS

Species group	All types	Forest type: Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	23,160	18,258	636	47	--	715	--	--	--	1,245	--	--	2,110	149	--
Red pine	39,921	4,550	28,267	380	23	271	--	--	15	1,027	363	273	4,668	34	50
White pine	19,795	820	538	5,825	245	988	709	--	1,229	1,297	59	2,743	5,162	180	--
White spruce	27,078	95	657	221	2,594	185	11,017	--	771	41	399	2,871	7,930	259	38
Black spruce	10,817	608	105	213	74	6,876	1,101	174	1,031	8	128	151	311	37	--
Balsam fir	28,966	106	105	351	237	470	8,621	93	1,904	--	872	3,905	10,877	1,425	--
Hemlock	11,519	--	--	80	--	22	160	--	151	--	309	10,493	239	65	--
Tamarack	907	--	22	18	--	169	55	395	83	--	34	25	65	41	--
Northern white-cedar	37,270	29	44	46	425	168	1,699	283	23,983	--	2,243	4,101	3,303	946	--
Other softwoods	2,546	--	--	--	73	19	1	--	--	--	--	113	269	--	2,071
Total	201,979	24,466	30,374	7,181	3,671	9,883	23,363	945	29,167	3,618	4,407	24,675	34,934	3,136	2,159
HARDWOODS															
White oak	12,910	58	18	25	--	--	--	--	--	11,210	104	968	489	38	--
Select red oak	31,890	709	--	162	--	--	103	--	--	18,611	345	5,886	5,590	484	--
Other red oak	7,080	698	--	--	--	--	--	--	--	5,502	45	565	270	--	--
Hickory	2,376	30	30	--	--	--	--	--	--	1,772	--	517	--	27	--
Basswood	18,245	32	70	--	--	--	29	--	24	679	1,057	15,012	986	356	--
Beech	7,385	--	--	15	--	--	--	--	--	193	87	6,743	162	185	--
Yellow birch	8,025	--	--	--	3	--	99	--	204	49	317	7,068	271	14	--
Hard maple	66,208	21	40	346	13	115	295	--	111	539	466	59,281	4,401	580	--
Soft maple	67,891	251	155	189	36	91	902	--	1,168	5,096	13,684	25,880	18,390	2,049	--
Elm	8,384	--	--	8	--	31	269	--	46	110	2,417	3,525	1,977	1	--
Ash	14,547	--	--	--	--	--	39	--	524	735	6,015	4,696	2,321	217	--
Cottonwood	949	--	--	--	--	--	--	--	--	52	364	321	212	--	--
Balsam poplar	6,039	--	--	--	49	27	298	6	156	--	152	425	4,587	189	150
Bigtooth aspen	26,844	25	85	7	--	--	--	--	26	2,235	14	1,967	22,109	376	--
Quaking aspen	58,942	232	132	399	245	1,280	1,776	100	322	735	712	3,464	48,747	798	--
Paper birch	23,871	--	73	167	79	361	1,256	5	1,615	314	696	2,399	7,854	9,052	--
Black cherry	9,826	--	--	34	49	--	469	--	--	1,631	403	3,387	3,774	--	79
Other hardwoods	2,998	33	--	--	--	--	--	--	28	411	842	1,409	275	--	--
Total	374,410	2,089	603	1,352	474	1,905	5,535	111	4,224	49,874	27,720	143,513	122,415	14,366	229
All species	576,389	26,555	30,977	8,533	4,145	11,788	28,898	1,056	33,391	53,492	32,127	168,188	157,349	17,502	2,388

(Table 34 continued on next page)

(Table 34 continued)

NORTHERN LOWER PENINSULA

Species group	All types	Forest type: Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	12,969	10,649	41	47	--	--	--	--	--	917	--	--	1,315	--	--
Red pine	26,453	3,064	18,595	252	--	--	--	--	--	902	--	273	3,367	--	--
White pine	8,225	56	--	2,372	--	233	--	--	284	534	--	776	3,914	56	--
White spruce	2,522	--	163	--	143	43	238	--	155	--	--	--	1,744	36	--
Black spruce	466	93	--	60	--	119	--	3	191	--	--	--	--	--	--
Balsam fir	3,108	--	--	99	11	10	414	7	394	--	19	114	1,817	223	--
Hemlock	1,302	--	--	--	--	--	--	--	92	--	58	1,062	59	31	--
Tamarack	188	--	--	--	--	--	1	104	14	--	--	25	18	26	--
Northern white-cedar	13,817	--	--	--	82	24	150	103	8,874	--	1,494	1,022	1,847	221	--
Other softwoods	1,564	--	--	--	--	--	--	--	--	--	--	--	269	--	1,295
Total	70,614	13,862	18,799	2,830	236	429	803	217	10,004	2,353	1,571	3,272	14,350	593	1,295
HARDWOODS															
White oak	6,413	58	18	--	--	--	--	--	--	5,797	--	137	365	38	--
Select red oak	21,718	672	--	44	--	--	--	--	--	13,088	--	2,304	5,208	402	--
Other red oak	4,230	698	--	--	--	--	--	--	--	3,225	--	37	270	--	--
Hickory	112	--	30	--	--	--	--	--	--	--	--	55	--	27	--
Basswood	8,718	32	70	--	--	--	--	--	24	220	401	7,352	401	218	--
Beech	2,637	--	--	--	--	--	--	--	--	49	--	2,274	129	185	--
Yellow birch	738	--	--	--	--	--	--	--	39	--	124	575	--	--	--
Hard maple	15,611	--	40	--	--	--	--	--	--	144	70	13,555	1,742	60	--
Soft maple	24,107	92	3	55	--	36	--	--	514	2,322	4,263	6,153	10,148	521	--
Elm	730	--	--	--	--	3	--	--	--	--	186	158	383	--	--
Ash	5,655	--	--	--	--	--	--	--	287	152	1,456	2,594	983	183	--
Cottonwood	317	--	--	--	--	--	--	--	--	--	--	105	212	--	--
Balsam poplar	2,090	--	--	--	43	20	--	1	99	--	120	55	1,556	46	150
Bigtooth aspen	21,296	25	85	7	--	--	--	--	18	1,826	--	1,260	17,901	174	--
Quaking aspen	23,332	138	--	32	17	116	90	--	181	531	330	1,217	20,389	291	--
Paper birch	6,015	--	--	93	--	31	196	5	662	176	282	763	1,837	1,970	--
Black cherry	3,571	--	--	34	--	--	132	--	--	354	--	781	2,270	--	--
Other hardwoods	311	--	--	--	--	--	--	--	14	21	47	61	168	--	--
Total	147,601	1,715	246	265	60	206	418	6	1,838	27,905	7,279	39,436	63,962	4,115	150
All species	218,215	15,577	19,045	3,095	296	635	1,221	223	11,842	30,258	8,850	42,708	78,312	4,708	1,445

(Table 34 continued on next page)

(Table 34 continued)

WESTERN UPPER PENINSULA

Species group	All types	Forest type: Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	3,212	2,146	103	--	--	123	--	--	--	--	--	--	691	149	--
Red pine	4,400	298	2,576	44	--	271	--	--	--	--	--	--	1,177	34	--
White pine	4,516	338	239	1,057	80	108	557	--	162	36	39	999	799	102	--
White spruce	11,210	36	--	133	1,807	142	3,562	--	153	--	198	1,942	3,119	118	--
Black spruce	4,496	81	4	--	74	2,926	670	124	161	8	12	151	267	18	--
Balsam fir	16,610	106	41	240	170	460	6,926	62	311	--	412	2,658	4,470	754	--
Hemlock	7,829	--	--	--	--	22	160	--	6	--	154	7,370	105	12	--
Tamarack	363	--	--	--	--	136	54	135	9	--	--	--	14	15	--
Northern white-cedar	7,655	--	--	31	--	144	811	--	3,448	--	373	2,561	201	86	--
Other softwoods	19	--	--	--	--	19	--	--	--	--	--	--	--	--	--
Total	60,310	3,005	2,963	1,505	2,131	4,351	12,740	321	4,250	44	1,188	15,681	10,843	1,288	--
HARDWOODS															
Select red oak	2,131	--	--	--	--	--	103	--	--	235	14	1,564	198	17	--
Basswood	4,971	--	--	--	--	--	29	--	--	--	66	4,533	343	--	--
Yellow birch	5,768	--	--	--	--	--	99	--	143	--	171	5,124	217	14	--
Hard maple	32,695	--	--	55	--	--	295	--	94	180	300	29,396	2,259	116	--
Soft maple	17,324	--	22	17	36	55	762	--	273	1	1,086	9,929	4,594	549	--
Elm	3,765	--	--	8	--	28	254	--	12	--	600	2,560	303	--	--
Ash	2,279	--	--	--	--	--	28	--	76	--	939	815	396	25	--
Balsam poplar	600	--	--	--	6	7	141	--	--	--	7	22	417	--	--
Bigtooth aspen	2,266	--	--	--	--	--	--	--	--	--	--	84	2,112	70	--
Quaking aspen	19,634	31	66	255	205	83	1,596	65	--	1	82	1,419	15,701	130	--
Paper birch	9,231	--	73	33	63	319	834	--	131	12	123	968	2,292	4,383	--
Black cherry	1,594	--	--	--	--	--	337	--	--	--	15	790	452	--	--
Other hardwoods	20	--	--	--	--	--	--	--	--	--	20	--	--	--	--
Total	102,278	31	161	368	310	492	4,478	65	729	429	3,423	57,204	29,284	5,304	--
All species	162,588	3,036	3,124	1,873	2,441	4,843	17,218	386	4,979	473	4,611	72,885	40,127	6,592	--

(Table 34 continued on next page)

(Table 34 continued)

EASTERN UPPER PENINSULA

Species group	All types	Forest type													
		Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	6,107	4,972	439	--	--	592	--	--	--	--	--	--	104	--	--
Red pine	7,385	1,188	6,039	84	23	--	--	--	15	16	--	--	--	--	20
White pine	4,286	426	49	1,375	165	647	152	--	783	--	20	543	104	22	--
White spruce	13,141	59	494	88	534	--	7,217	--	463	41	201	834	3,067	105	38
Black spruce	5,855	434	101	153	--	3,831	431	47	679	--	116	--	44	19	--
Balsam fir	9,248	--	64	12	56	--	1,281	24	1,199	--	441	1,133	4,590	448	--
Hemlock	2,290	--	--	80	--	--	--	--	53	--	97	1,963	75	22	--
Tamarack	328	--	22	18	--	33	--	156	60	--	6	--	33	--	--
Northern white-cedar	15,716	29	44	15	343	--	738	180	11,582	--	376	518	1,255	636	--
Other softwoods	55	--	--	--	--	--	1	--	--	--	--	--	--	--	54
Total	64,411	7,108	7,252	1,825	1,121	5,103	9,820	407	14,834	57	1,257	4,991	9,272	1,252	112
HARDWOODS															
White oak	14	--	--	--	--	--	--	--	--	14	--	--	--	--	--
Select red oak	694	37	--	--	--	--	--	--	--	316	--	163	113	65	--
Basswood	1,301	--	--	--	--	--	--	--	--	--	--	1,059	242	--	--
Beech	3,364	--	--	15	--	--	--	--	--	--	--	3,349	--	--	--
Yellow birch	1,211	--	--	--	3	--	--	--	22	--	22	1,110	54	--	--
Hard maple	13,565	21	--	291	13	115	--	--	17	26	96	12,182	400	404	--
Soft maple	12,265	159	130	117	--	--	140	--	381	107	1,125	6,146	3,029	931	--
Elm	1,574	--	--	--	--	--	15	--	34	--	301	507	717	--	--
Ash	976	--	--	--	--	--	11	--	161	--	415	94	287	8	--
Balsam poplar	2,918	--	--	--	--	--	157	5	57	--	25	175	2,356	143	--
Bigtooth aspen	2,317	--	--	--	--	--	--	--	8	--	14	328	1,835	132	--
Quaking aspen	13,583	63	66	112	23	1,081	90	35	132	12	51	551	11,002	365	--
Paper birch	7,860	--	--	41	16	11	226	--	822	--	291	668	3,161	2,624	--
Black cherry	468	--	--	--	--	--	--	--	--	--	--	404	64	--	--
Total	62,110	280	196	576	55	1,207	639	40	1,634	475	2,340	26,736	23,260	4,672	--
All species	126,521	7,388	7,448	2,401	1,176	6,310	10,459	447	16,468	532	3,597	31,727	32,532	5,924	112

(Table 34 continued on next page)

(Table 34 continued)

SOUTHERN LOWER PENINSULA

Species group	All types	Forest type													
		Jack pine	Red pine	White pine	White spruce	Black spruce	Balsam fir	Tamarack	Northern white-cedar	Oak-hickory	Elm-ash-maple	Maple-birch	Aspen	Paper birch	Exotic
SOFTWOODS															
Jack pine	872	491	53	--	--	--	--	--	--	328	--	--	--	--	--
Red pine	1,683	--	1,057	--	--	--	--	--	--	109	363	--	124	--	30
White pine	2,768	--	250	1,021	--	--	--	--	--	727	--	425	345	--	--
White spruce	205	--	--	--	110	--	--	--	--	--	--	95	--	--	--
Hemlock	98	--	--	--	--	--	--	--	--	--	--	98	--	--	--
Tamarack	28	--	--	--	--	--	--	--	--	--	28	--	--	--	--
Northern white-cedar	82	--	--	--	--	--	--	--	79	--	--	--	--	3	--
Other softwoods	908	--	--	--	73	--	--	--	--	--	--	113	--	--	722
Total	6,644	491	1,360	1,021	183	--	--	--	79	1,164	391	731	469	3	752
HARDWOODS															
White oak	6,483	--	--	25	--	--	--	--	--	5,399	104	831	124	--	--
Select red oak	7,347	--	--	118	--	--	--	--	--	4,972	331	1,855	71	--	--
Other red oak	2,850	--	--	--	--	--	--	--	--	2,277	45	528	--	--	--
Hickory	2,264	30	--	--	--	--	--	--	--	1,772	--	462	--	--	--
Basswood	3,255	--	--	--	--	--	--	--	--	459	590	2,068	--	138	--
Beech	1,384	--	--	--	--	--	--	--	--	144	87	1,120	33	--	--
Yellow birch	308	--	--	--	--	--	--	--	--	49	--	259	--	--	--
Hard maple	4,337	--	--	--	--	--	--	--	--	189	--	4,148	--	--	--
Soft maple	14,195	--	--	--	--	--	--	--	--	2,666	7,210	3,652	619	48	--
Elm	2,315	--	--	--	--	--	--	--	--	110	1,330	300	574	1	--
Ash	5,637	--	--	--	--	--	--	--	--	583	3,205	1,196	655	1	--
Cottonwood	632	--	--	--	--	--	--	--	--	52	364	216	--	--	--
Balsam poplar	431	--	--	--	--	--	--	--	--	--	--	173	258	--	--
Bigtooth aspen	965	--	--	--	--	--	--	--	--	409	--	295	261	--	--
Quaking aspen	2,393	--	--	--	--	--	--	--	9	191	249	277	1,655	12	--
Paper birch	765	--	--	--	--	--	--	--	--	126	--	--	564	75	--
Black cherry	4,193	--	--	--	49	--	--	--	--	1,277	388	1,412	988	--	79
Other hardwoods	2,667	33	--	--	--	--	--	--	14	390	775	1,348	107	--	--
Total	62,421	63	--	143	49	--	--	--	23	21,065	14,678	20,137	5,909	275	79
All species	69,065	554	1,360	1,164	232	--	--	--	102	22,229	15,069	20,868	6,378	278	831

1/ Tables may not add to totals due to rounding.

Table 35.--Average annual yields of growing stock from harvest by forest type, stand-age class, and Forest Survey Unit, Michigan, 2001-2010[1/]

(In thousand cubic feet)

ALL UNITS

Forest type	All ages	Stand-age class (years) 1-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	26,555	--	--	--	12,642	11,971	1,942	--	--	--	--	--
Red pine	30,977	--	--	15,035	14,203	912	424	403	--	--	--	--
White pine	8,533	--	--	--	--	--	--	1,164	1,158	6,211	--	--
White spruce	4,145	--	--	--	232	698	2,415	504	--	296	--	--
Black spruce	11,788	--	--	--	5,924	1,744	4,120	--	--	--	--	--
Balsam fir	28,898	--	--	--	--	17,578	10,099	1,078	143	--	--	--
Tamarack	1,056	--	--	--	111	304	641	--	--	--	--	--
Northern white-cedar	33,391	--	--	--	--	--	--	--	1,280	28,991	3,120	--
Oak-hickory	53,492	--	--	--	--	--	353	28,506	9,265	14,967	401	--
Elm-ash-maple	32,127	--	--	--	--	--	5,093	11,492	10,465	4,753	324	--
Maple-birch	168,188	--	--	--	--	--	--	34,767	25,208	97,190	11,023	--
Aspen	157,349	--	46,568	22,743	65,688	22,350	--	--	--	--	--	--
Paper birch	17,502	--	10	--	268	477	16,679	68	--	--	--	--
Exotic	2,388	--	--	2,388	--	--	--	--	--	--	--	--
All types	576,389	--	46,578	40,166	99,068	56,034	41,766	77,982	47,519	152,408	14,868	--

EASTERN UPPER PENINSULA

Jack pine	7,388	--	--	--	435	6,953	--	--	--	--	--	--
Red pine	7,448	--	--	1,527	5,921	--	--	--	--	--	--	--
White pine	2,401	--	--	--	--	--	--	--	1,158	1,243	--	--
White spruce	1,176	--	--	--	--	--	672	504	--	--	--	--
Black spruce	6,310	--	--	--	5,924	386	--	--	--	--	--	--
Balsam fir	10,459	--	--	--	--	10,459	--	--	--	--	--	--
Tamarack	447	--	--	--	--	--	447	--	--	--	--	--
Northern white-cedar	16,468	--	--	--	--	--	--	--	1,178	15,290	--	--
Oak-hickory	532	--	--	--	--	--	353	179	--	--	--	--
Elm-ash-maple	3,597	--	--	--	--	--	--	530	2,601	466	--	--
Maple-birch	31,727	--	--	--	--	--	--	--	--	31,727	--	--
Aspen	32,532	--	2,273	3,607	25,470	1,182	--	--	--	--	--	--
Paper birch	5,924	--	--	--	--	477	5,447	--	--	--	--	--
Exotic	112	--	--	112	--	--	--	--	--	--	--	--
All types	126,521	--	2,273	5,246	37,750	19,457	6,919	1,213	4,937	48,726	--	--

(Table 35 continued on next page)

(Table 35 continued)

Forest type	All ages	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
					Stand-age class (years)							
WESTERN UPPER PENINSULA												
Jack pine	3,036	--	--	--	--	1,094	1,942	--	--	--	--	--
Red pine	3,124	--	--	--	2,297	--	424	403	--	--	--	--
White pine	1,873	--	--	--	--	--	--	--	--	1,873	--	--
White spruce	2,441	--	--	--	--	698	1,743	--	--	--	--	--
Black spruce	4,843	--	--	--	--	849	3,994	--	--	--	--	--
Balsam fir	17,218	--	--	--	--	7,119	10,099	--	--	--	--	--
Tamarack	386	--	--	--	9	304	73	--	--	--	--	--
Northern white-cedar	4,979	--	--	--	--	--	--	--	--	1,859	3,120	--
Oak-hickory	473	--	--	--	--	--	--	--	--	72	401	--
Elm-ash-maple	4,611	--	--	--	--	--	--	--	--	4,287	324	--
Maple-birch	72,885	--	--	--	--	--	--	--	--	61,862	11,023	--
Aspen	40,127	--	--	--	18,959	21,168	--	--	--	--	--	--
Paper birch	6,592	--	--	--	--	--	6,592	--	--	--	--	--
All types	162,588	--	--	--	21,265	31,232	24,867	403	--	69,953	14,868	--
NORTHERN LOWER PENINSULA												
Jack pine	15,577	--	--	--	12,207	3,370	--	--	--	--	--	--
Red pine	19,045	--	--	13,508	5,537	--	--	--	--	--	--	--
White pine	3,095	--	--	--	--	--	--	--	--	3,095	--	--
White spruce	296	--	--	--	--	--	--	--	--	296	--	--
Black spruce	635	--	--	--	--	509	126	--	--	--	--	--
Balsam fir	1,221	--	--	--	--	--	--	1,078	143	--	--	--
Tamarack	223	--	--	--	102	--	121	--	--	--	--	--
Northern white-cedar	11,842	--	--	--	--	--	--	--	--	11,842	--	--
Oak-hickory	30,258	--	--	--	--	--	--	28,327	1,931	--	--	--
Elm-ash-maple	8,850	--	--	--	--	--	--	4,668	4,182	--	--	--
Maple-birch	42,708	--	--	--	--	--	--	29,645	13,063	--	--	--
Aspen	78,312	--	42,629	16,058	19,625	--	--	--	--	--	--	--
Paper birch	4,708	--	--	--	--	--	4,640	68	--	--	--	--
Exotic	1,445	--	--	1,445	--	--	--	--	--	--	--	--
All types	218,215	--	42,629	31,011	37,471	3,879	4,887	63,786	19,319	15,233	--	--
SOUTHERN LOWER PENINSULA												
Jack pine	554	--	--	--	--	554	--	--	--	--	--	--
Red pine	1,360	--	--	--	448	912	--	--	--	--	--	--
White pine	1,164	--	--	--	--	--	--	1,164	--	--	--	--
White spruce	232	--	--	--	232	--	--	--	--	--	--	--
Northern white-cedar	102	--	--	--	--	--	--	--	102	--	--	--
Oak-hickory	22,229	--	--	--	--	--	--	--	7,334	14,895	--	--
Elm-ash-maple	15,069	--	--	--	--	--	5,093	6,294	3,682	--	--	--
Maple-birch	20,868	--	--	--	--	--	--	5,122	12,145	3,601	--	--
Aspen	6,378	--	1,666	3,078	1,634	--	--	--	--	--	--	--
Paper birch	278	--	10	--	268	--	--	--	--	--	--	--
Exotic	831	--	--	831	--	--	--	--	--	--	--	--
All types	69,065	--	1,676	3,909	2,582	1,466	5,093	12,580	23,263	18,496	--	--

1/ Tables may not add to totals due to rounding.

Table 36.--Commercial forest area qualifying for thinning by forest type, stand-age class, and Forest Survey Unit, Michigan, 2001-2010[1/]

(In thousand acres)

Forest type	All ages	Stand-age class (years) 1-20	21-30	31-40	41-50	51-60	61-70	71-80	81+
ALL UNITS									
Red pine	134.8	--	13.1	74.1	47.5	--	--	--	--
White pine	2.9	--	--	--	2.9	--	--	--	--
White spruce	1.2	--	--	--	1.2	--	--	--	--
Oak-hickory	98.6	--	53.6	31.2	13.8	--	--	--	--
Maple-birch	2,363.4	--	206.3	200.5	151.9	289.6	781.2	733.8	--
All types	2,600.7	--	273.1	305.8	217.3	289.6	781.2	733.8	--
EASTERN UPPER PENINSULA									
Red pine	17.0	--	--	14.9	2.1	--	--	--	--
White spruce	1.2	--	--	--	1.2	--	--	--	--
Maple-birch	431.8	--	31.3	45.1	34.3	52.7	155.6	112.7	--
All types	449.9	--	31.3	60.0	37.6	52.7	155.6	112.7	--
WESTERN UPPER PENINSULA									
Red pine	22.0	--	--	13.9	8.1	--	--	--	--
Oak-hickory	1.6	--	--	--	1.6	--	--	--	--
Maple-birch	906.5	--	44.1	53.6	48.8	107.4	332.7	320.0	--
All types	930.1	--	44.1	67.5	58.5	107.4	332.7	320.0	--
NORTHERN LOWER PENINSULA									
Red pine	88.3	--	13.1	40.5	34.7	--	--	--	--
Oak-hickory	60.1	--	41.2	6.8	12.2	--	--	--	--
Maple-birch	724.5	--	47.6	48.4	35.2	80.6	237.6	275.1	--
All types	872.9	--	101.9	95.7	82.1	80.6	237.6	275.1	--
SOUTHERN LOWER PENINSULA									
Red pine	7.4	--	--	4.8	2.6	--	--	--	--
White pine	2.9	--	--	--	2.9	--	--	--	--
Oak-hickory	36.9	--	12.4	24.5	--	--	--	--	--
Maple-birch	300.6	--	83.4	53.4	33.6	48.9	55.3	26.0	--
All types	347.8	--	95.8	82.7	39.1	48.9	55.3	26.0	--

[1/] Tables may not add to totals due to rounding.

Table 37.--Average annual yields from thinning by species group, tree class, and Forest Survey Unit, Michigan, 2001-2010[1/]

(In thousand cubic feet)

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
ALL UNITS						
SOFTWOODS						
Jack pine	1,266	236	1,030	8	--	8
Red pine	16,494	4,135	12,359	244	--	244
White pine	3,519	633	2,886	94	--	94
White spruce	2,615	307	2,308	--	--	--
Black spruce	138	117	21	--	--	--
Balsam fir	4,269	2,344	1,925	15	--	15
Hemlock	2,231	149	2,082	63	13	50
Tamarack	5	--	5	--	--	--
Northern white-cedar	574	174	400	--	--	--
Other softwoods	443	245	198	--	--	--
Total	31,554	8,340	23,214	424	13	411
HARDWOODS						
White oak	887	222	665	--	--	--
Select red oak	2,908	403	2,505	151	80	71
Other red oak	415	57	358	85	--	85
Hickory	380	137	243	28	--	28
Basswood	20,878	1,878	19,000	637	191	446
Beech	842	589	253	12	--	12
Yellow birch	1,050	633	417	7	--	7
Hard maple	42,095	28,388	13,707	1,424	237	1187
Soft maple	26,070	12,123	13,947	886	86	800
Elm	6,326	1,639	4,687	200	21	179
Ash	4,761	2,546	2,215	122	68	54
Cottonwood	518	34	484	--	--	--
Balsam poplar	188	32	156	--	--	--
Bigtooth aspen	3,288	1,576	1,712	22	15	7
Quaking aspen	6,890	1,336	5,554	483	39	444
Paper birch	2,267	692	1,575	66	9	57
Black cherry	7,390	2,612	4,778	542	57	485
Other hardwoods	1,863	1,236	627	40	--	40
Total	129,016	56,133	72,883	4,705	803	3,902
All species	160,570	64,473	96,097	5,129	816	4,313
EASTERN UPPER PENINSULA						
SOFTWOODS						
Jack pine	54	--	54	--	--	--
Red pine	2,014	46	1,968	17	--	17
White pine	492	55	437	--	--	--
White spruce	959	229	730	--	--	--
Black spruce	138	117	21	--	--	--
Balsam fir	1,456	774	682	--	--	--
Hemlock	395	120	275	13	13	--
Northern white-cedar	86	36	50	--	--	--
Total	5,594	1,377	4,217	30	13	17
HARDWOODS						
Select red oak	80	--	80	16	16	--
Basswood	3,103	136	2,967	8	--	8
Beech	267	204	63	--	--	--
Yellow birch	204	88	116	--	--	--
Hard maple	8,900	4,987	3,913	345	75	270
Soft maple	5,543	2,838	2,705	218	35	183
Elm	827	228	599	51	--	51
Ash	202	43	159	11	11	--
Balsam poplar	34	--	34	--	--	--
Bigtooth aspen	118	16	102	--	--	--
Quaking aspen	331	98	233	--	--	--
Paper birch	330	70	260	42	9	33
Black cherry	1,171	543	628	116	--	116
Total	21,110	9,251	11,859	807	146	661
All species	26,704	10,628	16,076	837	159	678

(Table 37 continued on next page)

(Table 37 continued)

Species group	Tree class: Growing stock: Total	Growing stock: Pole-timber	Growing stock: Saw-timber	Cull: Total	Cull: Shortlog	Cull: Other 2/
WESTERN UPPER PENINSULA						
SOFTWOODS						
Red pine	2,348	908	1,440	11	--	11
White pine	409	--	409	--	--	--
White spruce	1,617	39	1,578	--	--	--
Balsam fir	2,601	1,421	1,180	15	--	15
Hemlock	1,217	13	1,204	50	--	50
Northern white-cedar	229	14	215	--	--	--
Total	8,421	2,395	6,026	76	--	76
HARDWOODS						
Select red oak	447	98	349	35	21	14
Basswood	11,257	1,063	10,194	354	163	191
Yellow birch	705	432	273	7	--	7
Hard maple	16,584	11,760	4,824	834	85	749
Soft maple	7,414	3,609	3,805	209	13	196
Elm	2,776	434	2,342	149	21	128
Ash	518	284	234	17	--	17
Balsam poplar	154	32	122	--	--	--
Bigtooth aspen	469	163	306	--	--	--
Quaking aspen	3,386	314	3,072	342	22	320
Paper birch	740	250	490	24	--	24
Black cherry	917	425	492	6	--	6
Total	45,367	18,864	26,503	1,977	325	1,652
All species	53,788	21,259	32,529	2,053	325	1,728
NORTHERN LOWER PENINSULA						
SOFTWOODS						
Jack pine	1,212	236	976	8	--	8
Red pine	11,222	2962	8,260	40	--	40
White pine	2,087	436	1,651	35	--	35
White spruce	39	39	--	--	--	--
Balsam fir	212	149	63	--	--	--
Hemlock	619	16	603	--	--	--
Tamarack	5	--	5	--	--	--
Northern white-cedar	259	124	135	--	--	--
Other softwoods	23	--	23	--	--	--
Total	15,678	3,962	11,716	83	--	83
HARDWOODS						
White oak	266	131	135	--	--	--
Select red oak	2,018	273	1,745	57	--	57
Other red oak	331	57	274	85	--	85
Basswood	5,785	545	5,240	115	28	87
Beech	524	334	190	12	--	12
Yellow birch	93	65	28	--	--	--
Hard maple	14,415	9,710	4,705	245	77	168
Soft maple	9,159	4,131	5,028	403	38	365
Elm	810	141	669	--	--	--
Ash	1,360	414	946	19	--	19
Bigtooth aspen	2,396	1,148	1,248	22	15	7
Quaking aspen	2,751	750	2,001	141	17	124
Paper birch	1,014	285	729	--	--	--
Black cherry	1,886	239	1,647	308	57	251
Other hardwoods	277	144	133	--	--	--
Total	43,085	18,367	24,718	1,407	232	1,175
All species	58,763	22,329	36,434	1,490	232	1,258

(Table 37 continued on next page)

(Table 37 continued)

SOUTHERN LOWER PENINSULA

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2]
SOFTWOODS						
Red pine	910	219	691	176	--	176
White pine	531	142	389	59	--	59
Other softwoods	420	245	175	--	--	--
Total	1,861	606	1,255	235	--	235
HARDWOODS						
White oak	621	91	530	--	--	--
Select red oak	363	32	331	43	43	--
Other red oak	84	--	84	--	--	--
Hickory	380	137	243	28	--	28
Basswood	733	134	599	160	--	160
Beech	51	51	--	--	--	--
Yellow birch	48	48	--	--	--	--
Hard maple	2,196	1,931	265	--	--	--
Soft maple	3,954	1,545	2,409	56	--	56
Elm	1,913	836	1,077	--	--	--
Ash	2,681	1,805	876	75	57	18
Cottonwood	518	34	484	--	--	--
Bigtooth aspen	305	249	56	--	--	--
Quaking aspen	422	174	248	--	--	--
Paper birch	183	87	96	--	--	--
Black cherry	3,416	1,405	2,011	112	--	112
Other hardwoods	1,586	1,092	494	40	--	40
Total	19,454	9,651	9,803	514	100	414
All species	21,315	10,257	11,058	749	100	649

[1] Tables may not add to totals due to rounding.
[2] Rough and rotten cull.

Table 38.--Average annual yields of growing stock from thinning by species group, forest type, and Forest Survey Unit, Michigan, 2001-2010[1/]

(In thousand cubic feet)

Species group	Total	Red pine	White pine	White spruce	Balsam fir	Oak-hickory	Maple-birch
ALL UNITS							
			Forest type[2/]				
SOFTWOODS							
Jack pine	1,266	1,028	--	--	--	84	154
Red pine	16,494	14,408	--	178	--	843	1,065
White pine	3,519	177	142	--	--	--	3,200
White spruce	2,615	--	--	--	--	--	2,615
Black spruce	138	--	--	--	--	--	138
Balsam fir	4,269	281	--	--	--	--	3,988
Hemlock	2,231	--	--	--	--	--	2,231
Tamarack	5	--	--	--	--	--	5
Northern white-cedar	574	--	--	--	--	--	574
Other softwoods	443	--	--	--	--	--	443
Total	31,554	15,894	142	178	--	927	14,413
HARDWOODS							
White oak	887	112	--	--	--	215	560
Select red oak	2,908	--	--	--	--	497	2,411
Other red oak	415	99	--	--	--	316	--
Hickory	380	--	--	--	--	81	299
Basswood	20,878	--	--	--	--	--	20,878
Beech	842	--	--	--	--	42	800
Yellow birch	1,050	--	--	--	--	--	1,050
Hard maple	42,095	89	--	--	--	--	42,006
Soft maple	26,070	--	--	--	--	1,188	24,882
Elm	6,326	--	--	--	--	21	6,305
Ash	4,761	--	--	--	--	56	4,705
Cottonwood	518	--	--	--	--	--	518
Balsam poplar	188	--	--	--	--	--	188
Bigtooth aspen	3,288	216	--	--	--	217	2,855
Quaking aspen	6,890	993	--	--	--	423	5,474
Paper birch	2,267	17	--	--	--	--	2,250
Black cherry	7,390	22	--	--	--	1,137	6,231
Other hardwoods	1,863	93	--	--	--	158	1,612
Total	129,016	1,641	--	--	--	4,351	123,024
All species	160,570	17,535	142	178	--	5,278	137,437
EASTERN UPPER PENINSULA							
SOFTWOODS							
Jack pine	54	54	--	--	--	--	--
Red pine	2,014	1,815	--	178	--	--	21
White pine	492	--	--	--	--	--	492
White spruce	959	--	--	--	--	--	959
Black spruce	138	--	--	--	--	--	138
Balsam fir	1,456	177	--	--	--	--	1,279
Hemlock	395	--	--	--	--	--	395
Northern white-cedar	86	--	--	--	--	--	86
Total	5,594	2,046	--	178	--	--	3,370
HARDWOODS							
Select red oak	80	--	--	--	--	--	80
Basswood	3,103	--	--	--	--	--	3,103
Beech	267	--	--	--	--	--	267
Yellow birch	204	--	--	--	--	--	204
Hard maple	8,900	--	--	--	--	--	8,900
Soft maple	5,543	--	--	--	--	--	5,543
Elm	827	--	--	--	--	--	827
Ash	202	--	--	--	--	--	202
Balsam poplar	34	--	--	--	--	--	34
Bigtooth aspen	118	--	--	--	--	--	118
Quaking aspen	331	--	--	--	--	--	331
Paper birch	330	--	--	--	--	--	330
Black cherry	1,171	--	--	--	--	--	1,171
Total	21,110	--	--	--	--	--	21,110
All species	26,704	2,046	--	178	--	--	24,480

(Table 38 continued on next page)

(Table 38 continued)

Species group	Total	Red pine	White pine	White spruce	Balsam fir	Oak-hickory	Maple-birch
			WESTERN UPPER PENINSULA				
			Forest type[2/]				
SOFTWOODS							
Red pine	2,348	2,256	--	--	--	92	--
White pine	409	--	--	--	--	--	409
White spruce	1,617	--	--	--	--	--	1,617
Balsam fir	2,601	--	--	--	--	--	2,601
Hemlock	1,217	--	--	--	--	--	1,217
Northern white-cedar	229	--	--	--	--	--	229
Total	8,421	2,256	--	--	--	92	6,073
HARDWOODS							
Select red oak	447	--	--	--	--	--	447
Basswood	11,257	--	--	--	--	--	11,257
Yellow birch	705	--	--	--	--	--	705
Hard maple	16,584	--	--	--	--	--	16,584
Soft maple	7,414	--	--	--	--	--	7,414
Elm	2,776	--	--	--	--	--	2,776
Ash	518	--	--	--	--	--	518
Balsam poplar	154	--	--	--	--	--	154
Bigtooth aspen	469	--	--	--	--	--	469
Quaking aspen	3,386	161	--	--	--	--	3,225
Paper birch	740	17	--	--	--	--	723
Black cherry	917	--	--	--	--	--	917
Total	45,367	178	--	--	--	--	45,189
All species	53,788	2,434	--	--	--	92	51,262
			NORTHERN LOWER PENINSULA				
SOFTWOODS							
Jack pine	1,212	974	--	--	--	84	154
Red pine	11,222	9,427	--	--	--	751	1,044
White pine	2,087	177	--	--	--	--	1,910
White spruce	39	--	--	--	--	--	39
Balsam fir	212	104	--	--	--	--	108
Hemlock	619	--	--	--	--	--	619
Tamarack	5	--	--	--	--	--	5
Northern white-cedar	259	--	--	--	--	--	259
Other softwoods	23	--	--	--	--	--	23
Total	15,678	10,682	--	--	--	835	4,161
HARDWOODS							
White oak	266	--	--	--	--	97	169
Select red oak	2,018	--	--	--	--	439	1,579
Other red oak	331	99	--	--	--	232	0
Basswood	5,785	--	--	--	--	--	5,785
Beech	524	--	--	--	--	42	482
Yellow birch	93	--	--	--	--	--	93
Hard maple	14,415	89	--	--	--	--	14,326
Soft maple	9,159	--	--	--	--	1,188	7,971
Elm	810	--	--	--	--	--	810
Ash	1,360	--	--	--	--	--	1,360
Bigtooth aspen	2,396	216	--	--	--	217	1,963
Quaking aspen	2,751	832	--	--	--	130	1,789
Paper birch	1,014	--	--	--	--	--	1,014
Black cherry	1,886	22	--	--	--	111	1,753
Other hardwoods	277	--	--	--	--	158	119
Total	43,085	1,258	--	--	--	2,614	39,213
All species	58,763	11,940	--	--	--	3,449	43,374

(Table 38 continued on next page)

(Table 38 continued)

SOUTHERN LOWER PENINSULA

Species group	Total	Forest type[2/] Red pine	White pine	White spruce	Balsam fir	Oak-hickory	Maple-birch
SOFTWOODS							
Red pine	910	910	--	--	--	--	--
White pine	531	--	142	--	--	--	389
Other softwoods	420	--	--	--	--	--	420
Total	1,861	910	142	--	--	--	809
HARDWOODS							
White oak	621	112	--	--	--	118	391
Select red oak	363	--	--	--	--	58	305
Other red oak	84	--	--	--	--	84	--
Hickory	380	--	--	--	--	81	299
Basswood	733	--	--	--	--	--	733
Beech	51	--	--	--	--	--	51
Yellow birch	48	--	--	--	--	--	48
Hard maple	2,196	--	--	--	--	--	2,196
Soft maple	3,954	--	--	--	--	--	3,954
Elm	1,913	--	--	--	--	21	1,892
Ash	2,681	--	--	--	--	56	2,625
Cottonwood	518	--	--	--	--	--	518
Bigtooth aspen	305	--	--	--	--	--	305
Quaking aspen	422	--	--	--	--	293	129
Paper birch	183	--	--	--	--	--	183
Black cherry	3,416	--	--	--	--	1,026	2,390
Other hardwoods	1,586	93	--	--	--	--	1,493
Total	19,454	205	--	--	--	1,737	17,512
All species	21,315	1,115	142	--	--	1,737	18,321

[1/] Tables may not add to totals due to rounding.

[2/] Thinning was treatment option only in the forest types shown below.

Table 39.--Average annual yields of growing stock from thinning by forest type, stand-age class, and Forest Survey Unit, Michigan, 2001-2010[1/]

(In thousand cubic feet)

Forest type	All ages	Stand-age class (years) 1-20	21-30	31-40	41-50	51-60	61-70	71-80	81+
ALL UNITS									
Red pine	17,535	--	2,176	8,465	6,894	--	--	--	--
White pine	142	--	--	--	142	--	--	--	--
White spruce	178	--	--	--	178	--	--	--	--
Oak-hickory	5,278	--	3,772	1,036	470	--	--	--	--
Maple-birch	137,437	--	13,056	12,088	8,646	19,053	43,469	41,125	--
All types	160,570	--	19,004	21,589	16,330	19,053	43,469	41,125	--
EASTERN UPPER PENINSULA									
Red pine	2,046	--	--	1,678	368	--	--	--	--
White spruce	178	--	--	--	178	--	--	--	--
Maple-birch	24,480	--	2,095	2,399	2,081	3,888	7,957	6,060	--
All types	26,704	--	2,095	4,077	2,627	3,888	7,957	6,060	--
WESTERN UPPER PENINSULA									
Red pine	2,434	--	--	1,084	1,350	--	--	--	--
Oak-hickory	92	--	--	--	92	--	--	--	--
Maple-birch	51,262	--	2,184	3,250	2,553	6,813	18,491	17,971	--
All types	53,788	--	2,184	4,334	3,995	6,813	18,491	17,971	--
NORTHERN LOWER PENINSULA									
Red pine	11,940	--	2,176	5,082	4,682	--	--	--	--
Oak-hickory	3,449	--	2,912	159	378	--	--	--	--
Maple-birch	43,374	--	3,502	2,797	1,985	5,076	14,405	15,609	--
All types	58,763	--	8,590	8,038	7,045	5,076	14,405	15,609	--
SOUTHERN LOWER PENINSULA									
Red pine	1,115	--	--	621	494	--	--	--	--
White pine	142	--	--	--	142	--	--	--	--
Oak-hickory	1,737	--	860	877	--	--	--	--	--
Maple-birch	18,321	--	5,275	3,642	2,027	3,276	2,616	1,485	--
All types	21,315	--	6,135	5,140	2,663	3,276	2,616	1,485	--

[1/] Tables may not add to totals due to rounding.

Table 40.--Commercial forest area qualifying for timber stand improvement by forest type, stand-age class, and Forest Survey Unit, Michigan, 2001-2010[1/]

(In thousand acres)

Forest type	Total	1-20	21-30	31-40	41-50	51-60	61-70	71-80	81+
				ALL UNITS					
				Stand-age class (years)					
Jack pine	6.8	--	4.6	2.3	--	--	--	--	--
Red pine	0.8	--	--	0.8	--	--	--	--	--
White pine	5.8	--	5.8	--	--	--	--	--	--
White spruce	11.2	--	3.7	7.5	--	--	--	--	--
Balsam fir	14.2	--	1.6	12.5	--	--	--	--	--
Northern white-cedar	56.1	--	--	--	56.1	--	--	--	--
Oak-hickory	21.6	--	11.0	10.5	--	--	--	--	--
Maple-birch	200.2	--	40.1	44.2	14.3	28.3	30.7	42.6	--
All types	316.6	--	66.8	77.8	70.4	28.3	30.7	42.6	--
				EASTERN UPPER PENINSULA					
White pine	3.6	--	3.6	--	--	--	--	--	--
White spruce	4.7	--	1.5	3.2	--	--	--	--	--
Balsam fir	5.3	--	--	5.3	--	--	--	--	--
Northern white-cedar	37.1	--	--	--	37.1	--	--	--	--
Maple-birch	49.7	--	6.5	7.5	2.9	12.9	6.0	13.8	--
All types	100.3	--	11.6	16.0	40.0	12.9	6.0	13.8	--
				WESTERN UPPER PENINSULA					
White spruce	1.6	--	--	1.6	--	--	--	--	--
Balsam fir	6.6	--	1.6	4.9	--	--	--	--	--
Northern white-cedar	8.4	--	--	--	8.4	--	--	--	--
Maple-birch	74.3	--	8.1	16.0	1.6	9.8	15.1	23.8	--
All types	90.9	--	9.7	22.5	10.0	9.8	15.1	23.8	--
				NORTHERN LOWER PENINSULA					
Jack pine	6.8	--	4.6	2.3	--	--	--	--	--
Red pine	0.8	--	--	0.8	--	--	--	--	--
White pine	2.2	--	2.2	--	--	--	--	--	--
White spruce	4.9	--	2.2	2.7	--	--	--	--	--
Balsam fir	2.3	--	--	2.3	--	--	--	--	--
Northern white-cedar	7.3	--	--	--	7.3	--	--	--	--
Oak-hickory	10.7	--	3.5	7.1	--	--	--	--	--
Maple-birch	41.8	--	8.7	9.1	7.2	2.2	9.6	5.0	--
All types	76.8	--	21.2	24.3	14.5	2.2	9.6	5.0	--
				SOUTHERN LOWER PENINSULA					
Northern white-cedar	3.3	--	--	--	3.3	--	--	--	--
Oak-hickory	10.9	--	7.5	3.4	--	--	--	--	--
Maple-birch	34.4	--	16.8	11.6	2.6	3.4	--	--	--
All types	48.6	--	24.3	15.0	5.9	3.4	--	--	--

[1/] Tables may not add to totals due to rounding.

Table 41.--Average annual yields from timber stand improvement by species group tree class, and Forest Survey Unit, Michigan, 2001-2010[1/]

(In thousand cubic feet)

Species group	Tree class					
	Growing stock			Cull		
	Total	Pole-timber	Saw-timber	Total	Shortlog	Other[2/]
ALL UNITS						
SOFTWOODS						
Red pine	101	--	101	--	--	--
White pine	169	--	169	25	--	25
White spruce	1,094	--	1,094	--	--	--
Black spruce	28	--	28	--	--	--
Balsam fir	1,163	787	376	--	--	--
Total	2,555	787	1,768	25	--	25
HARDWOODS						
Soft maple	107	--	107	--	--	--
Balsam poplar	53	42	11	8	--	8
Bigtooth aspen	57	--	57	--	--	--
Quaking aspen	535	194	341	36	--	36
Total	752	236	516	44	--	44
All species	3,307	1,023	2,284	69	--	69
EASTERN UPPER PENINSULA						
SOFTWOODS						
White pine	122	--	122	25	--	25
White spruce	49	--	49	--	--	--
Balsam fir	753	617	136	--	--	--
Total	924	617	307	25	--	25
HARDWOODS						
Soft maple	107	--	107	--	--	--
Balsam poplar	33	22	11	8	--	8
Bigtooth aspen	57	--	57	--	--	--
Quaking aspen	223	110	113	23	--	23
Total	420	132	288	31	--	31
All species	1,344	749	595	56	--	56
WESTERN UPPER PENINSULA						
SOFTWOODS						
Balsam fir	117	97	20	--	--	--
Total	117	97	20	--	--	--
HARDWOODS						
Balsam poplar	20	20	--	--	--	--
Quaking aspen	189	84	105	--	--	--
Total	209	104	105	--	--	--
All species	326	201	125	--	--	--
NORTHERN LOWER PENINSULA						
SOFTWOODS						
Red pine	101	--	101	--	--	--
White pine	47	--	47	--	--	--
White spruce	1,045	--	1,045	--	--	--
Black spruce	28	--	28	--	--	--
Balsam fir	293	73	220	--	--	--
Total	1,514	73	1,441	--	--	--
HARDWOODS						
Quaking aspen	123	--	123	13	--	13
Total	123	--	123	13	--	13
All species	1,637	73	1,564	13	--	13
SOUTHERN LOWER PENINSULA						
SOFTWOODS						
Total	--	--	--	--	--	--
HARDWOODS						
Total	--	--	--	--	--	--
All species	--	--	--	--	--	--

[1/] Tables may not add to totals due to rounding.
[2/] Rough and rotten cull.

Table 42.--Average annual yields of growing stock from timber stand improvement by species group, forest type, and Forest Survey Unit, Michigan 2001-2010[1/]

(In thousand cubic feet)

Species group	All types	Forest type[2/]							
		Jack pine	Red pine	White pine	White spruce	Balsam fir	Northern white-cedar	Oak-hickory	Maple-birch
ALL UNITS									
SOFTWOODS									
Red pine	101	--	--	101	--	--	--	--	--
White pine	169	--	--	169	--	--	--	--	--
White spruce	1,094	--	--	--	1,094	--	--	--	--
Black spruce	28	--	--	--	28	--	--	--	--
Balsam fir	1,163	--	--	--	214	--	949	--	--
Total	2,555	--	--	270	1,336	--	949	--	--
HARDWOODS									
Soft maple	107	--	--	107	--	--	--	--	--
Balsam poplar	53	--	--	--	--	--	53	--	--
Bigtooth aspen	57	--	--	--	--	57	--	--	--
Quaking aspen	535	--	--	--	33	417	85	--	--
Total	752	--	--	107	33	474	138	--	--
All species	3,307	--	--	377	1,369	474	1,087	--	--
EASTERN UPPER PENINSULA									
SOFTWOODS									
White pine	122	--	--	122	--	--	--	--	--
White spruce	49	--	--	--	49	--	--	--	--
Balsam fir	753	--	--	--	--	--	753	--	--
Total	924	--	--	122	49	--	753	--	--
HARDWOODS									
Soft maple	107	--	--	107	--	--	--	--	--
Balsam poplar	33	--	--	--	--	--	33	--	--
Bigtooth aspen	57	--	--	--	--	57	--	--	--
Quaking aspen	223	--	--	--	33	120	70	--	--
Total	420	--	--	107	33	177	103	--	--
All species	1,344	--	--	229	82	177	856	--	--
WESTERN UPPER PENINSULA									
SOFTWOODS									
Balsam fir	117	--	--	--	--	--	117	--	--
Total	117	--	--	--	--	--	117	--	--
HARDWOODS									
Balsam poplar	20	--	--	--	--	--	20	--	--
Quaking aspen	189	--	--	--	--	189	--	--	--
Total	209	--	--	--	--	189	20	--	--
All species	326	--	--	--	--	189	137	--	--

(Table 42 continued on next page)

(Table 42 continued)

Species group	All types	Forest type[2/]							
		Jack pine	Red pine	White pine	White spruce	Balsam fir	Northern white-cedar	Oak-hickory	Maple-birch
NORTHERN LOWER PENINSULA									
SOFTWOODS									
Red pine	101	--	--	101	--	--	--	--	--
White pine	47	--	--	47	--	--	--	--	--
White spruce	1,045	--	--	--	1,045	--	--	--	--
Black spruce	28	--	--	--	28	--	--	--	--
Balsam fir	293	--	--	--	214	--	79	--	--
Total	1,514	--	--	148	1,287	--	79	--	--
HARDWOODS									
Quaking aspen	123	--	--	--	--	108	15	--	--
Total	123	--	--	--	--	108	15	--	--
All species	1,637	--	--	148	1,287	108	94	--	--
SOUTHERN LOWER PENINSULA									
SOFTWOODS									
Total	--	--	--	--	--	--	--	--	--
HARDWOODS								--	--
Total	--	--	--	--	--	--	--	--	--
All species	--	--	--	--	--	--	--	--	--

[1/] Tables may not add to totals due to rounding.
[2/] Timber stand improvement was a treatment option only in the forest types shown below.

Table 43.--Average annual yields of growing stock from timber stand improvement by forest type, stand-age class, and Forest Survey Unit, Michigan, 2001-2010[1/]

(In thousand cubic feet)

Forest type	All ages	Stand-age class (years) 1-20	21-30	31-40	41-50	51+
ALL UNITS						
White pine	377	--	377	--	--	--
White spruce	1,369	--	586	783	--	--
Balsam fir	474	--	--	474	--	--
Northern white-cedar	1,087	--	--	--	1,087	--
All types	3,307	--	963	1,257	1,087	--
EASTERN UPPER PENINSULA						
White pine	229	--	229	--	--	--
White spruce	82	--	33	49	--	--
Balsam fir	177	--	--	177	--	--
Northern white-cedar	856	--	--	--	856	--
All types	1,344	--	262	226	856	--
WESTERN UPPER PENINSULA						
Balsam fir	189	--	--	189	--	--
Northern white-cedar	137	--	--	--	137	--
All types	326	--	--	189	137	--
NORTHERN LOWER PENINSULA						
White pine	148	--	148	--	--	--
White spruce	1,287	--	553	734	--	--
Balsam fir	108	--	--	108	--	--
Northern white-cedar	94	--	--	--	94	--
All types	1,637	--	701	842	94	--
SOUTHERN LOWER PENINSULA						
All types	--	--	--	--	--	--

[1/] Tables may not add to totals due to rounding.

Table 44.--Average annual yields of growing stock from harvest by species group, tree class, and Forest Survey Unit, Michigan, 1979 and estimated 1981-1990[1/]

(In thousand cubic feet)

Species group	All Units		Eastern Upper Peninsula		Western Upper Peninsula		Northern Lower Peninsula		Southern Lower Peninsula	
	Reported 1979 removals	Stems estimated 1981-1990 avg. annual removals	Reported 1979 removals	Stems estimated 1981-1990 avg. annual removals	Reported 1979 removals	Stems estimated 1981-1990 avg. annual removals	Reported 1979 removals	Stems estimated 1981-1990 avg. annual removals	Reported 1979 removals	Stems estimated 1981-1990 avg. annual removals
SOFTWOODS										
Jack pine	16,192	15,300	5,230	4,300	2,889	2,197	7,999	8,457	74	346
Red pine	7,798	16,116	1,422	3,497	1,945	2,011	3,105	9,797	1,326	811
White pine	5,097	20,208	1,691	4,819	2,409	5,474	872	7,489	125	2,426
White spruce	2,194	10,721	997	2,917	1,100	6,134	87	1,670	10	--
Black spruce	2,441	5,503	1,432	3,364	921	1,691	88	448	--	--
Balsam fir	8,931	19,119	4,273	6,365	3,816	9,312	842	3,442	--	--
Hemlock	6,633	14,573	2,554	3,909	3,868	7,582	185	2,699	26	383
Tamarack	772	1,458	151	583	79	454	438	334	104	87
Northern white-cedar	6,088	36,230	3,396	14,709	976	9,968	1,633	11,369	83	184
Other softwoods	221	1,513	--	--	--	--	--	904	221	609
Total	56,367	140,741	21,146	44,463	18,003	44,823	15,249	46,609	1,969	4,846
HARDWOODS										
White oak	8,984	11,761	17	--	23	95	3,006	5,543	5,938	6,123
Select red oak	20,599	28,859	151	374	1,417	2,093	11,720	17,888	7,311	8,504
Other red oak	6,073	4,099	--	--	--	--	3,541	2,596	2,532	1,503
Hickory	647	1,804	--	--	--	--	15	37	632	1,767
Basswood	4,794	8,787	482	224	1,153	1,268	1,980	4,765	1,179	2,530
Beech	5,840	8,459	3,444	4,166	101	25	1,539	3,185	756	1,083
Yellow birch	4,894	10,154	1,616	2,821	3,224	6,143	40	999	14	191
Hard maple	32,271	46,786	9,179	6,390	14,549	23,529	5,310	13,602	3,233	3,265
Soft maple	23,982	45,197	3,189	8,837	6,075	9,901	8,839	16,605	5,879	9,854
Elm	6,997	3,329	1,289	402	3,351	1,677	1,731	281	626	969
Ash	5,614	12,650	313	905	547	2,389	2,090	5,367	2,664	3,989
Cottonwood	1,291	2,390	--	--	--	18	454	384	837	1,988
Balsam poplar	2,370	8,946	926	2,876	651	1,435	784	4,294	9	341
Bigtooth aspen	31,390	30,512	1,509	2,158	3,792	2,676	25,206	23,189	883	2,489
Quaking aspen	51,805	47,639	8,658	10,066	22,510	15,121	20,023	20,737	614	1,715
Paper birch	7,734	19,978	2,471	5,875	2,574	6,672	2,579	7,198	110	233
Other hardwoods[2/]	2,944	5,780	108	264	332	837	418	1,960	2,086	2,719
Total	218,229	297,130	33,352	45,358	60,299	73,879	89,275	128,630	35,303	49,263
All species	274,596	437,871	54,498	89,821	78,302	118,702	104,524	175,239	37,272	54,109

[1/] Table may not add to totals due to rounding.

[2/] Includes black cherry.

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Michigan's predicted timber yields 1981-2010. Res. Pap. NC-243. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1983. 98 p.

Provides a view of the timber supply potential for Michigan during the period 1981-2010. Forest management areas and timber volume statistics are presented for each survey unit in the State.

KEY WORDS: Area, timber supply, timber harvest, timber removals, STEMS.